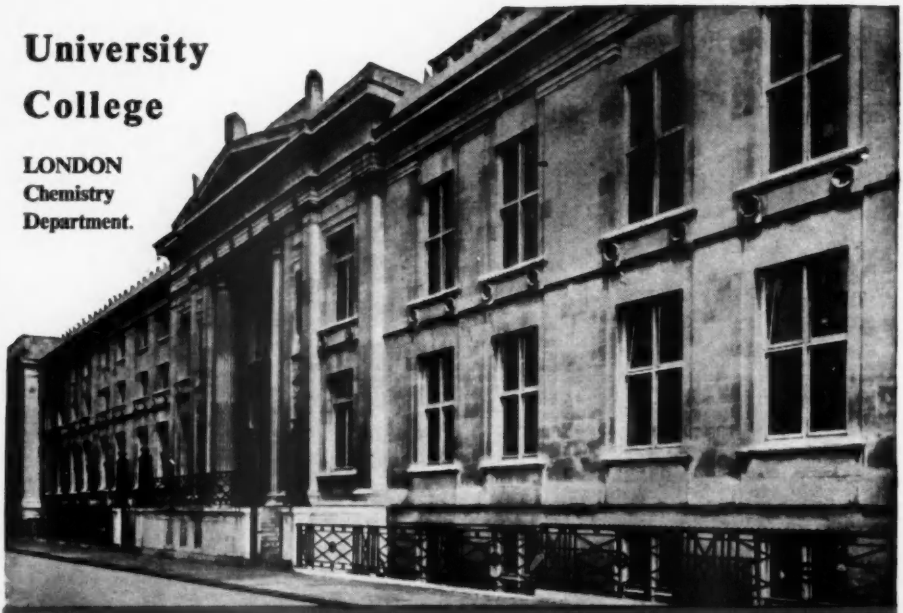
ELECTRICAL TIMES

THURSDAY
18 MAY
1950
SIXPENCE

University College

LONDON Chemistry Department.



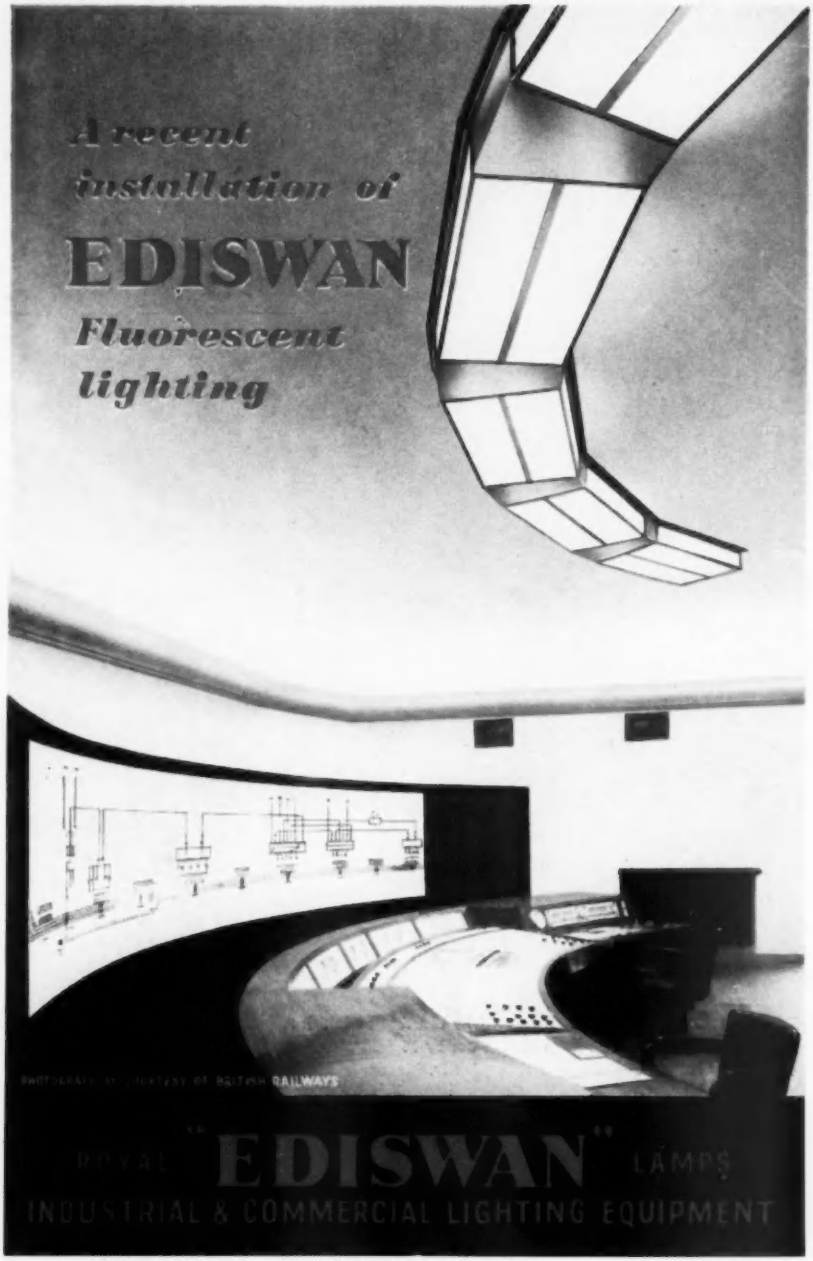
Photograph by courtesy of University College

Re-wiring and modernising of the electricity distribution in this famous education centre in Bloomsbury has been carried out by Messrs. Barlow and Young, Ltd. to the specification of the consulting engineers, Messrs. Barlow Leslie & Partners, using Henley Rubber Cables exclusively, the installation including 662 lighting points and over 2,000 switch plugs.

Contractors: Barlow & Young Ltd., Palace Street, S.W.1

Let Henley Cables carry the Current

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD. 52-53 HATTON GARDEN, LONDON E.C.1



THE EDISON SWAN ELECTRIC CO. LTD., 155 CHARING CROSS ROAD, LONDON, W.C.2

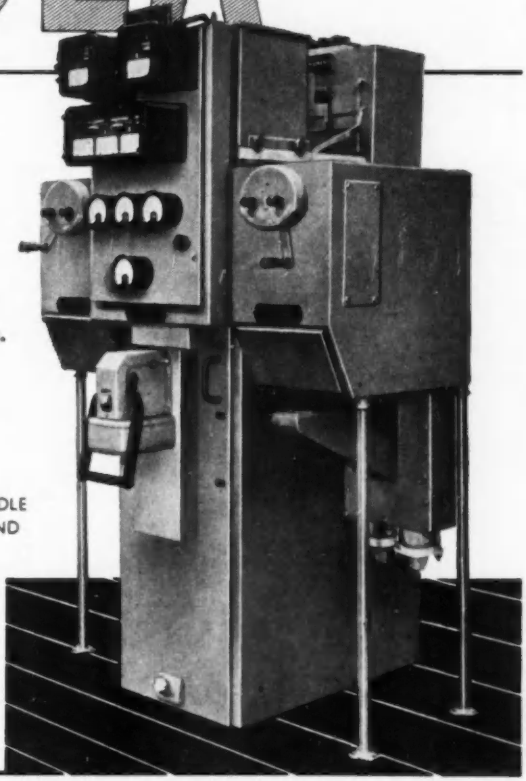
L 104

'ENGLISH ELECTRIC'

Air-insulated Metal-clad

OLX SWITCHGEAR

A.S.T.A. CERTIFIED FOR RATINGS OF 100 MVA AND 150 MVA AT 6·6 KV AND 100 MVA AND 150 MVA AT 11 KV
Maximum Current 800 amps.



- FITTED WITH THE WELL-KNOWN AND PROVED DE-ION GRID ARC CONTROL DEVICE.
- CIRCUIT-BREAKER OPERATING HANDLE FITTED WITH MAKING-CURRENT AND REVERSE MOTION RELEASES.
- FULLY ACCESSIBLE FOR CABLING, INSPECTION AND MAINTENANCE.
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Write for descriptive publication.

The English Electric Company Ltd.
SWITCHGEAR DEPARTMENT - - - LIVERPOOL
WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

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Size: 4¼" × 2½" × 1¾"

TEBEAM

REMOTE CONTROL UNIT

WITH **PILOT LAMP**

★ **COMPACT SIZE**
★ **ALL INSULATED**
★ **15-20 AMPS — A.C. ONLY**

The Ideal Control for

IMMERSION HEATERS — FIRES
WASHBOILERS — FANS
PORTABLE TOOLS — ETC.

LIST PRICE: **Fused Type 23/6 each**
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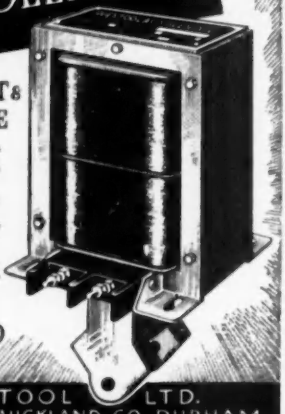
WESTOOL A.C. SOLENOIDS
SERIES 100



COMPACT & RELIABLE

Plunger weight 1 0lb
Total Weight 6 5lb
Firing centres 2"×3⅛"
Max. Pulls 10,15 or 20lb
Max. stroke 2"

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THE STEEL COVERED HEATER WITH

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IN its variety of forms, the Cressall steel jacketed unit heater is the solution to most heating problems. Let a Cressall Technical Expert discuss heating with you before you decide. He will be happy to help.

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BILL SWITCH-PLUGS.

15 AMPERE 3 PIN INSULATED AND IRONCLAD.
MADE TO THE USUAL BILL STANDARD - ROBUST, NEAT AND INCORPORATING AN ENTIRELY NEW METHOD OF CONTACT.

SEND FOR DESCRIPTIVE LEAFLET AND SWITCHGEAR STOCK LIST.

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in the baby show

And *what* a baby. The Baby Belling has an oven capacity of 1,943.5 cubic inches—which in housewives' language means the largest joint, with its attendant roast "spuds", a Yorkshire pudding, and the "afters" in the shape of a fruit pie, flan or tart, all cooked comfortably in the oven for the same meal. And that's not all. On top is a grill-boiling plate 10½" x 8" for three or four saucepans, while the grill takes two big kippers or plenty of toast. Then there's a large compartment under the oven for keeping plates and meals hot. The Baby Belling will regularly cook all the meals for a family of two or three, and can cope successfully with larger numbers when occasion demands. Some baby!

LIST NO. 45A BABY BELLING COOKER
£12 . 10 . 0. Consumption: Full-on 3.2 kw.
Overall size: 18" wide x 15½" deep x 20" high. Weight: 71 lbs.
Finishes: White vitreous enamel with black vitreous hob.
Two-tone cream with black vitreous hob, 5/- extra.
AVAILABLE ON STAND (40/- extra) OR CABINET (80/- extra).
Simmerstats can be fitted in place of "Three-heat" switches at 15/6 each.

You can't beat a 'Belling'

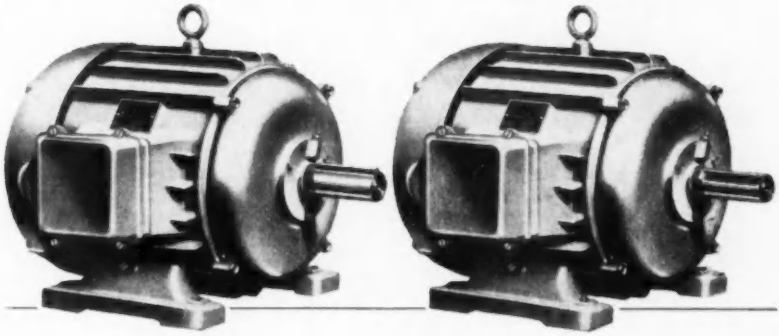
ALL ORDERS CAN NOW BE FULFILLED PROMPTLY

BELLING & CO. LTD., BRIDGE WORKS, ENFIELD, MIDDLESEX

CEC 345

REAL STANDARDISATION AT LAST

Which motor is the American standard?



Which is the British?

Apart from shaft size, these two motors are outwardly identical. They show how the new range of Crompton Parkinson A.C. motors solves the vexed question of British and American standards. One standard frame motor is mechanically and electrically interchangeable with American and Canadian makes of the same H.P. The other has a more highly rated electrical design to meet British users' needs for compactness. This introduction is a decisive step towards a British and all-world standard in electric motors. It comes from the Company which for over 30 years has done more than any other to bring the benefits of simplification and standardisation to the users of electric motors.

These new designs are additional to the Crompton Parkinson existing comprehensive range.

Crompton Parkinson LIMITED

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The R·E·A·L PLINTH LIGHT

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Are you stocked to meet the demand ?

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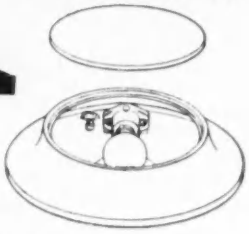
REAL WORKS · BIRMINGHAM 18

CONSTRUCTIONAL DETAILS



RETAILING AT
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also THE JUNIOR PLINTH

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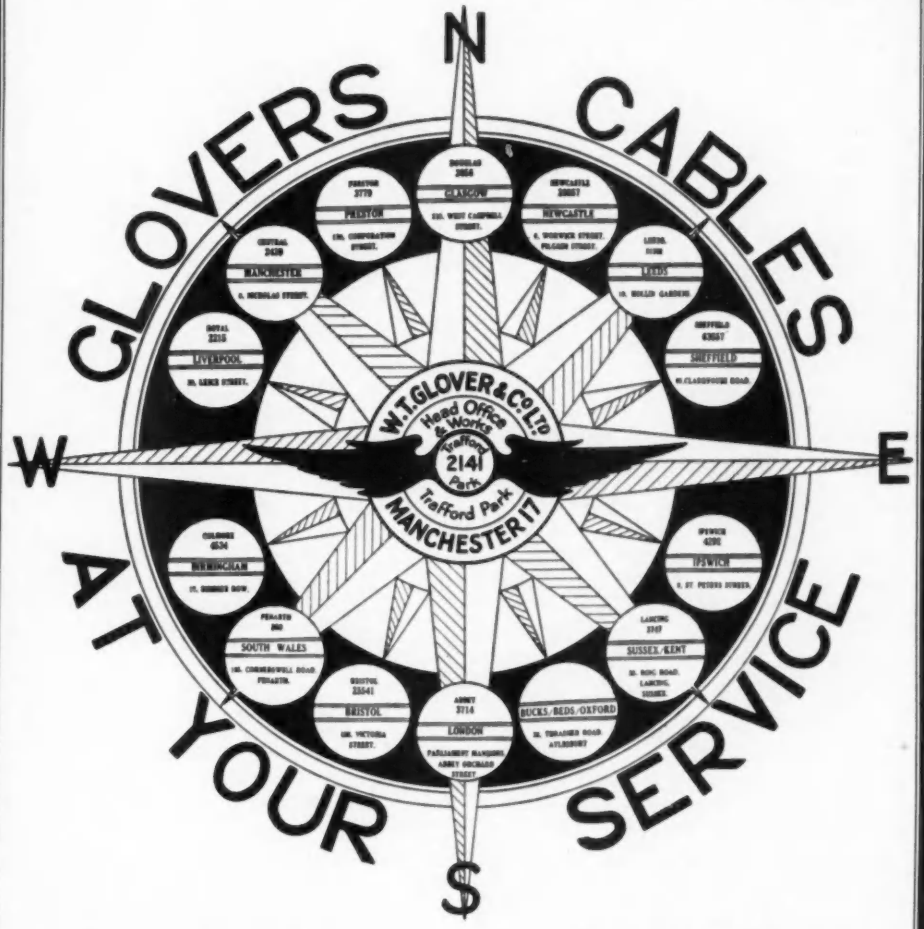
FROM STOCK AT ALL POINTS OF THE COMPASS



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For reliability ...

The outer sign of Inner Quality

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HEAVY capacity direct-current "Erskine Heap" Switchboard supplied many years ago and still giving good service in a large Gas Works in Britain.

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We Manufacture:

SWITCHGEAR 50/5,000 Amps. CONTROL GEAR ¼ H.P./5,000 H.P.

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BRANCH OFFICES AND AGENCIES IN ALL PARTS OF THE WORLD

611

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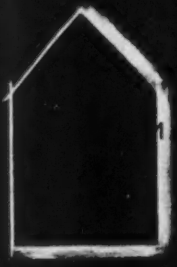

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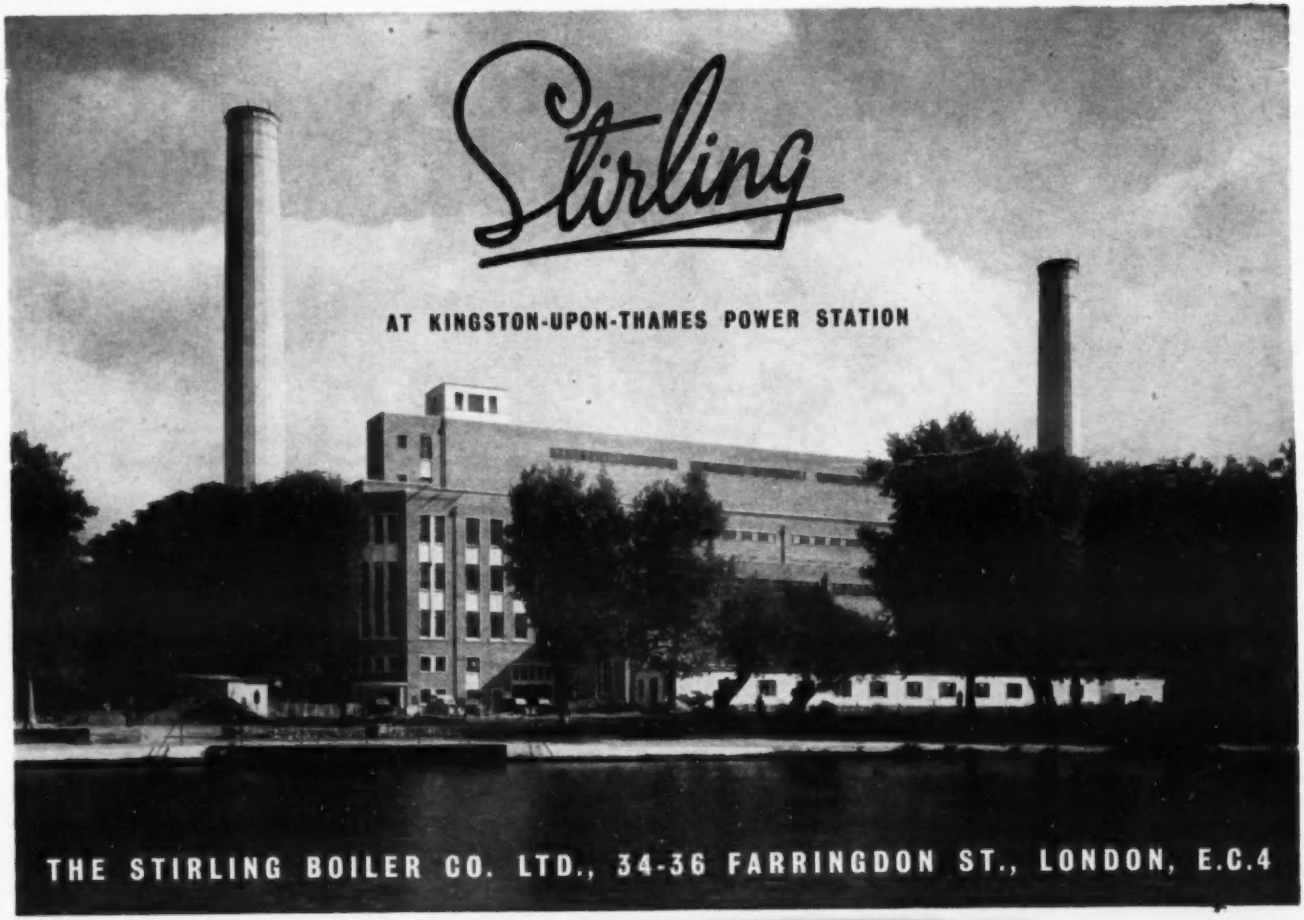
Simplex Electrical Company Limited Oldbury Birmingham & Branches A COMPANY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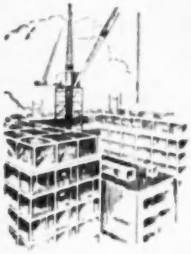

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in the chain bringing electricity from the mains to the factories, farms, shops, offices and homes is the private electrical contractor and retailer.

Members of the Electrical Contractors Association and of its allied organisation N.E.C.T.A. carry out 85 per cent of all the electrical contracting work done in Great Britain. Prompt, efficient service is assured when work is entrusted to their safe hands. It will pay you to support commercial enterprise when considering your electrical needs.

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It sells on appearance... it sells on cooking space... it sells on performance... and it is supported by selling advertising and selling literature. That is why the B.N.E. C.49 is in and out of the showroom so quickly.
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Industrial Motors

and Control Gear

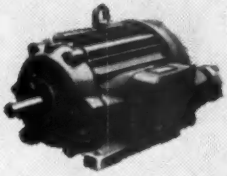
A.C. squirrel-cage induction motor (die-cast frame)

T.E. fan-cooled D.C. motor

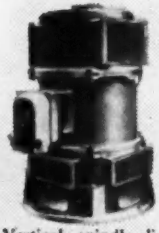
BTH is particularly well placed to meet the needs of Industry for electric equipment in general—D.C. and A.C. (single or polyphase) motors and associated control gear in particular. Present day production represents the results of over fifty years' continued progress in original research, design, and manufacture, of all types and sizes of rotating electric machines—second to none in performance and reliability.

No manufacturer can offer a wider choice in electric motors. Whatever the conditions of service or type of drive there is a BTH motor well suited to the job.

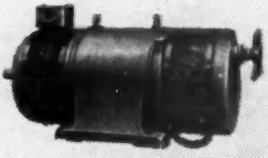
A.C. slip-ring drip-proof motor.



T.E. fan-cooled squirrel-cage flameproof motor.



Vertical spindle slip-ring induction motor



A.C. variable-speed commutator-motor

BRITISH THOMSON-HOUSTON

THE BRITISH THOMSON-HOUSTON CO., LTD., RUGBY, ENGLAND

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It's quicker and it's cheaper to order your Press Tool Sets from

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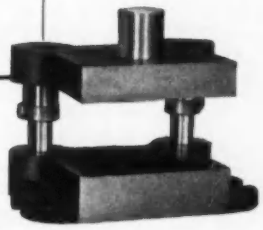

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DESOUTTER BROS. LIMITED, THE HYDE, HENDON, LONDON, N.W.9. TELEGRAMS: DESPNUCO, HYDE, LONDON
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MOTORS
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SWITCHES
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SUITABLE FOR
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In order that we may give you the best service under the present difficult conditions, we appeal to you to utilise standard equipment, ratings, etc., whenever possible. Your co-operation in this respect will enable us to concentrate on standard production with consequent reduction in despatch time.

USE "STANDARD"

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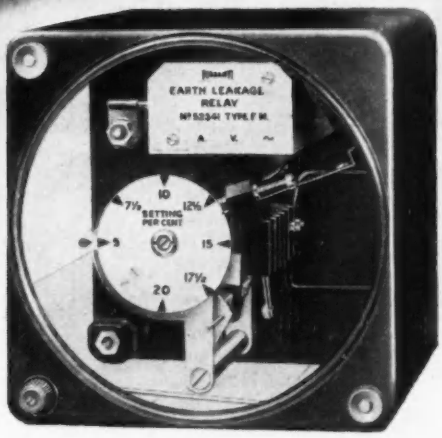
FERRANTI

ELECTROMAGNETIC RELAY



This newly designed Type FM relay possesses many interesting features:—

Balanced armature in jewelled bearings ensures great sensitivity.

Mechanical catch prevents operation due to vibration.

One, two or three pairs of independent contacts can be fitted, to close or to open circuit.

Continuously variable settings.

Moulded case of pleasing appearance.

External resetting of contacts and flag indicator.

Please write for List IR.6 giving full particulars.

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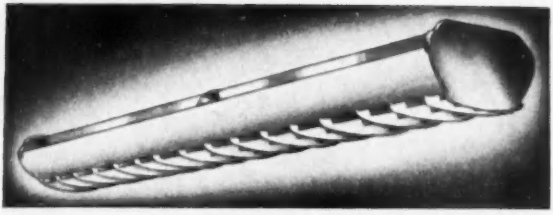
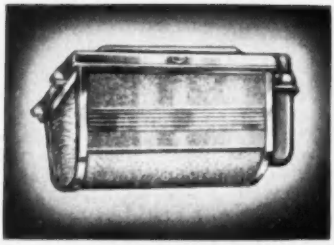
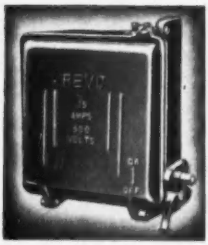
Just a Selection

from the wide range of REVO Electrical Specialities.

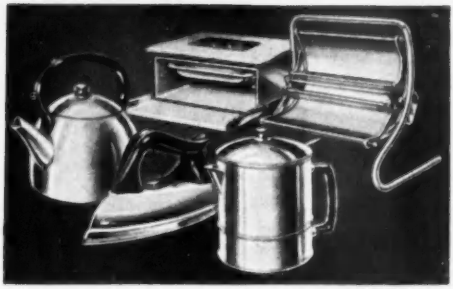
Other products include street lighting columns and brackets in cast iron, steel and concrete; the company also undertakes the installation and erection of this equipment.







See them on
STAND C.301
B. I. F.
Castle Bromwich



(From left to right)—Princess "464" Electric Cooker. One of a range of Decorative Lighting Fittings for fluorescent lamps. The "Silverblue" Street Lighting Fitting for mercury vapour discharge lamps. An example from the extensive range of Revo Switch and Fuse gear. The "Peerless" Electric Cooker for table use or with special stand. A group of Domestic Appliances. 8in. Electric Fan for desk or wall mounting.

REVO REGD.

REVO ELECTRIC COMPANY LTD., TIPTON, STAFFS.

We took a load off his shoulders..

At one time his job was weighing him down so much that people thought he was looking for cigarette ends. That was until B.C.E. took over his load of electrical supply problems . . . he's been walking on air ever since.

And no wonder! He knows that *everything* he wants, whether it's a single 5-amp. switch or a 50-H.P. motor, can be obtained from B.C.E. He knows, too, that he can rely on this 42-year-old firm for courteous service, prompt delivery and sound advice.

THE CENTRE OF ELECTRICAL SERVICE

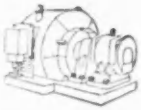
BCE CO. LTD.

BRITISH CENTRAL ELECTRICAL CO. LTD.

(DEPT. T), 6-8 ROSEBERY AVENUE, LONDON, E.C.1

Telephone: TERminus 2525 (6 lines) *Telegrams: "Briticent, Smith, London"*

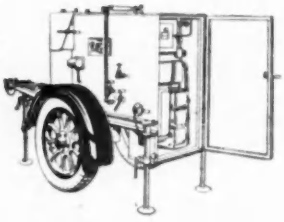
Est. 1908



"FOR US IT IS AN ESSENTIAL SERVICE . . . ." says the power engineer

The Stream-Line Filter plant by a simple mechanical operation keeps the insulating value of oil in transformers and switchgear at over 60 k.v. It contributes materially to the reliability of our whole service.

Stream-Line Portable plants are weatherproof and automatic with capacities of 5 to 500 gallons per hour.



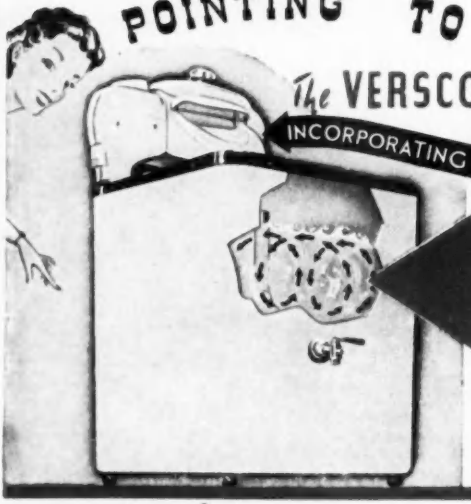
STREAM-LINE FILTERS LTD

HELE-SHAW WORKS · INGATE PLACE · LONDON · S.W.8

POINTING TO PERFECTION

The VERSCO TYPE D.L.1. *"Flush-action" washer*

INCORPORATING THE NEW "ACME" POWER WRINGER



Yes! This is the renowned VERSCO "flush-action" method of washing, no agitator pounding against those precious clothes, just the forceful action of the water slowly turning the clothes over and over (as shown by the arrows).

. . . and on top of that, the World's finest power-wringer — the new "ACME." What could be more value for your money than this

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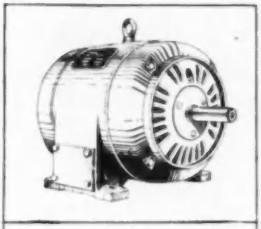
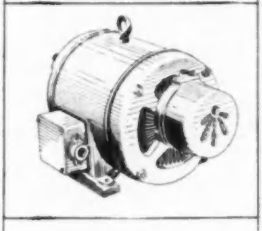
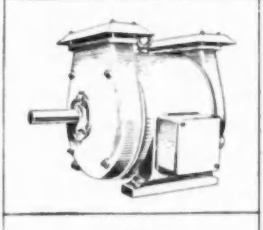
FULLEDGE WORKS, BURNLEY, LANCS. Tel.: 3121.

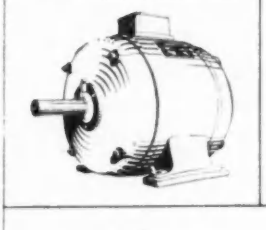
Quality and Service

. . . GUARANTEED BY **BRUSH**









The manufacturing, inspection and testing facilities at the Cardiff factory have been completely re-organised, and The BRUSH ELECTRICAL ENGINEERING CO. LTD. is now marketing machines under the name of 'HOPKINSON'. All Electric Motors leaving this factory are backed by 70 years' experience in the electrical industry and are FULLY GUARANTEED as to QUALITY and PERFORMANCE by BRUSH.
May we ask your continued support.

HOPKINSON MOTORS

are available at competitive prices and for
IMMEDIATE DELIVERY

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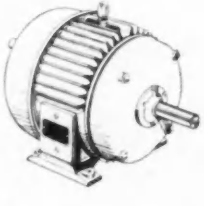

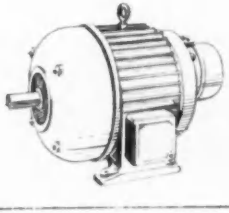

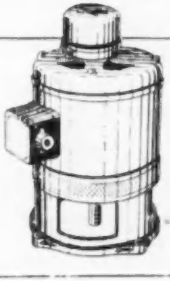

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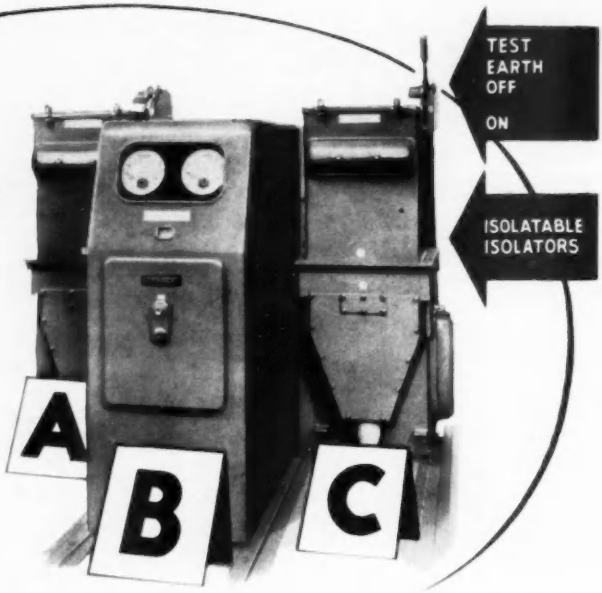

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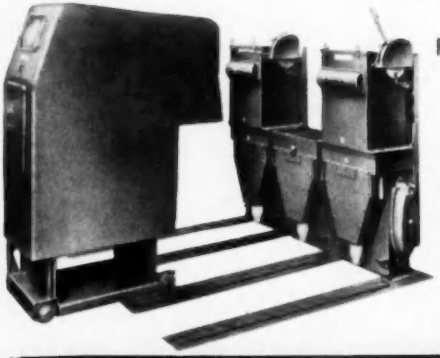

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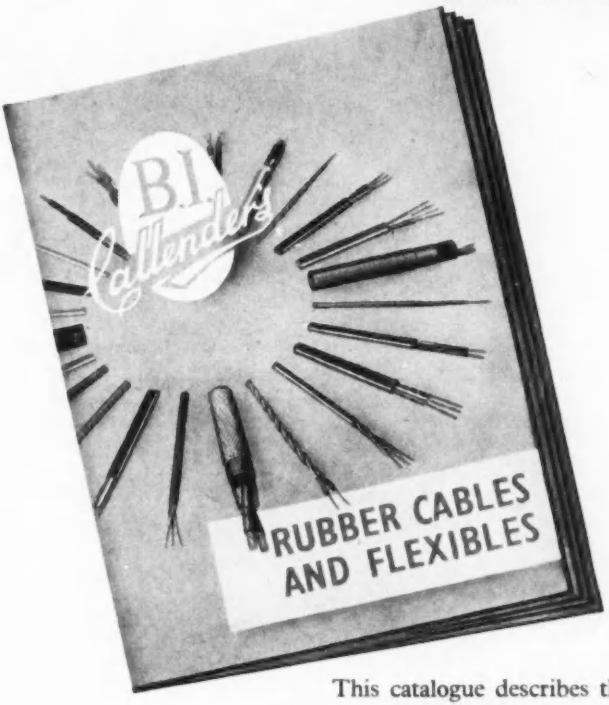

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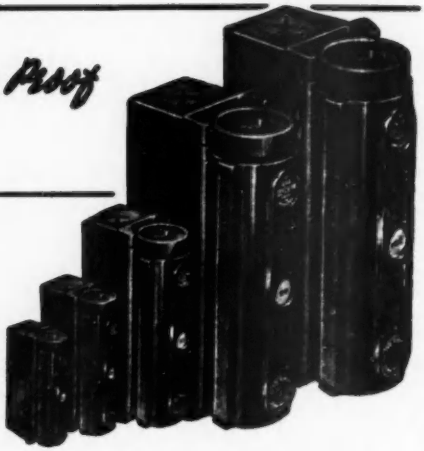

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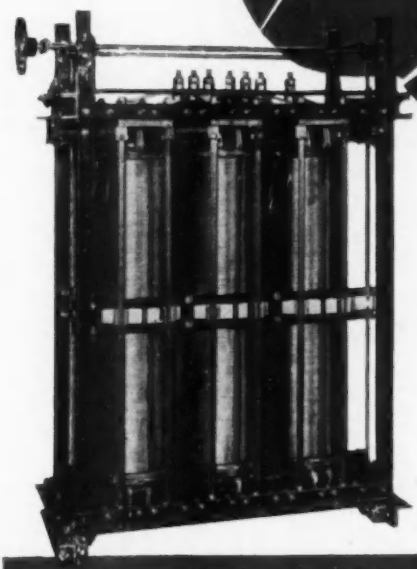

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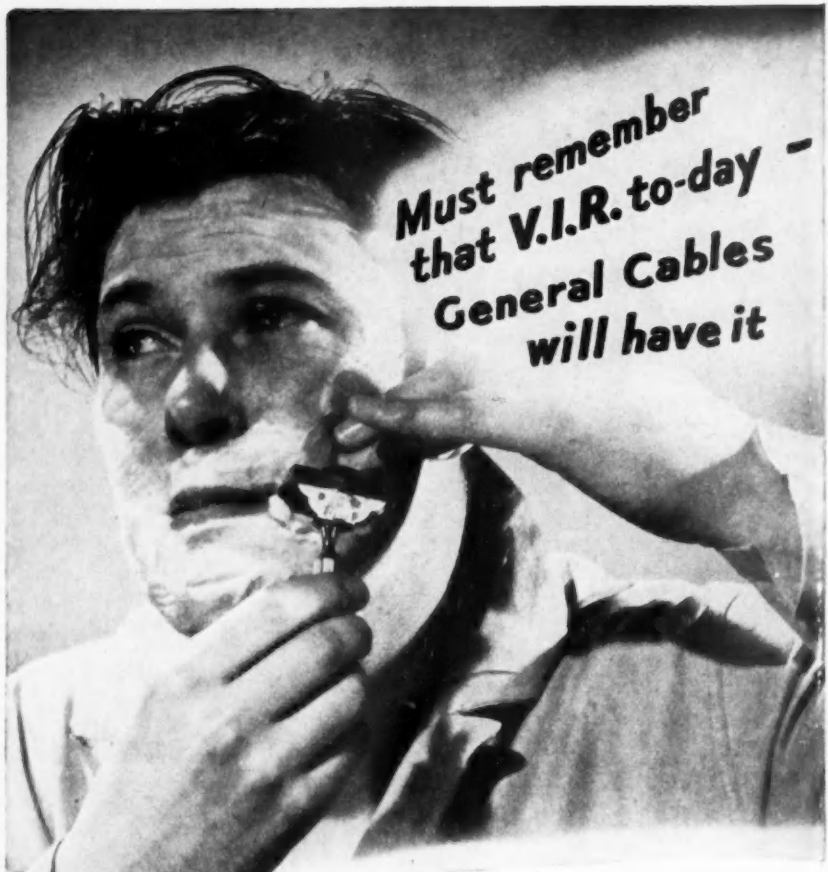

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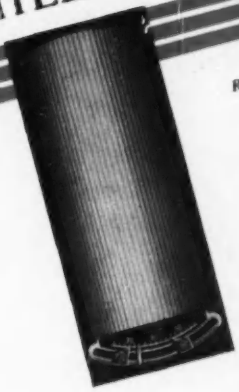

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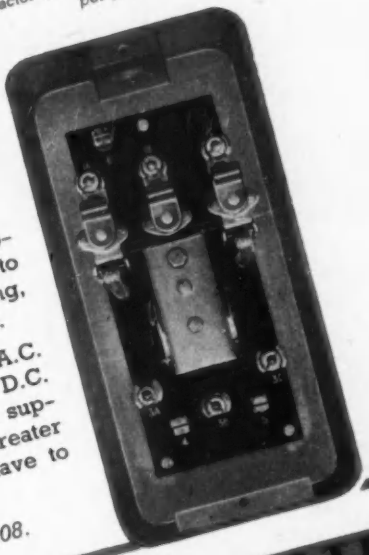

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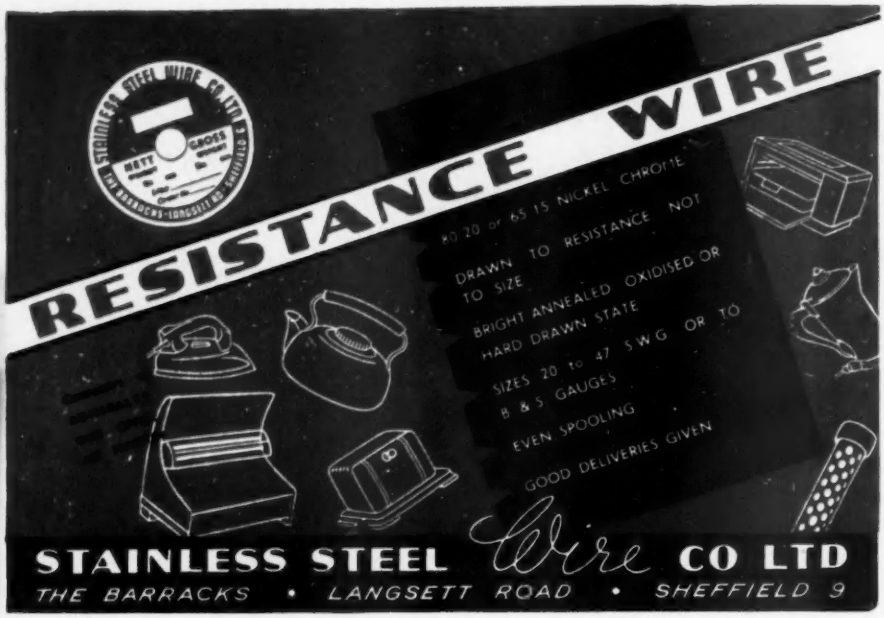
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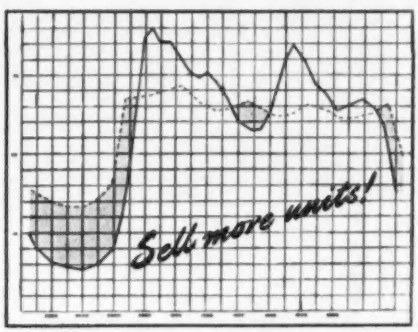

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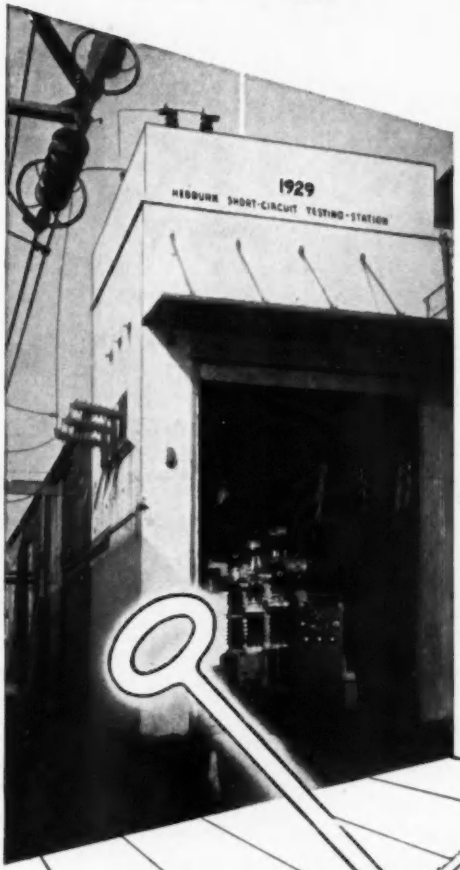

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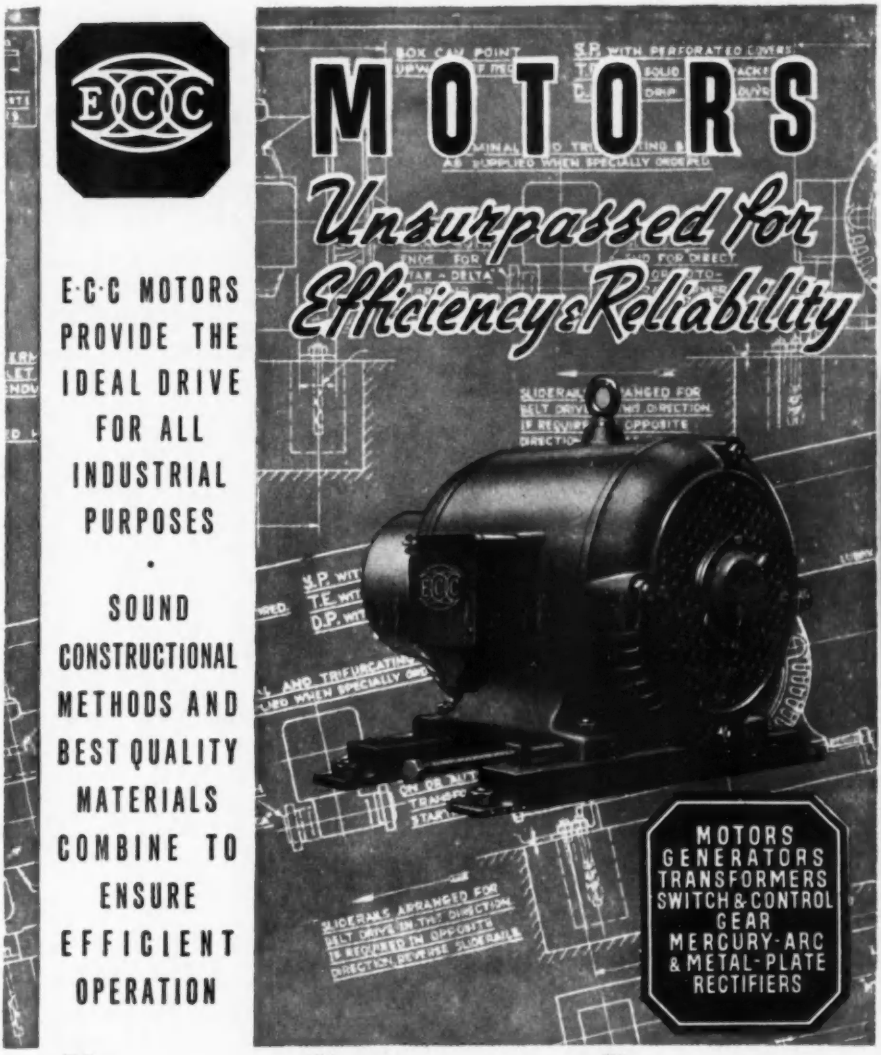
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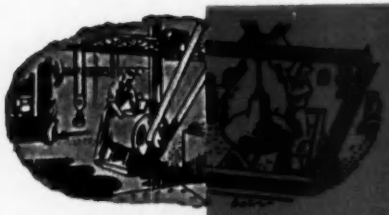

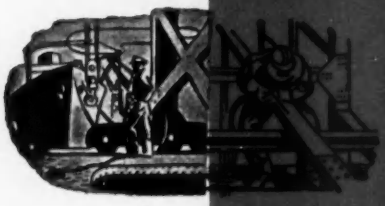

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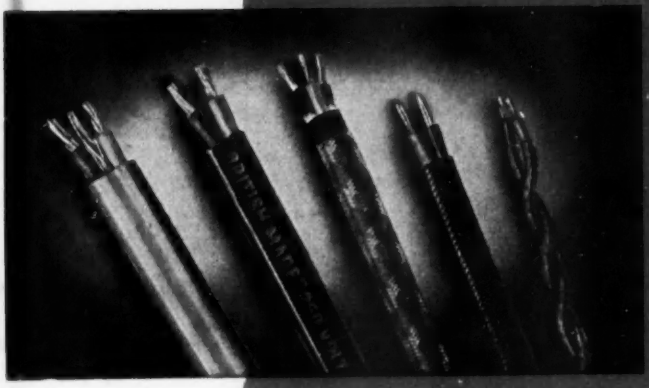

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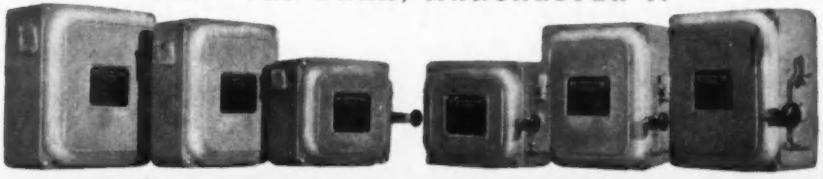

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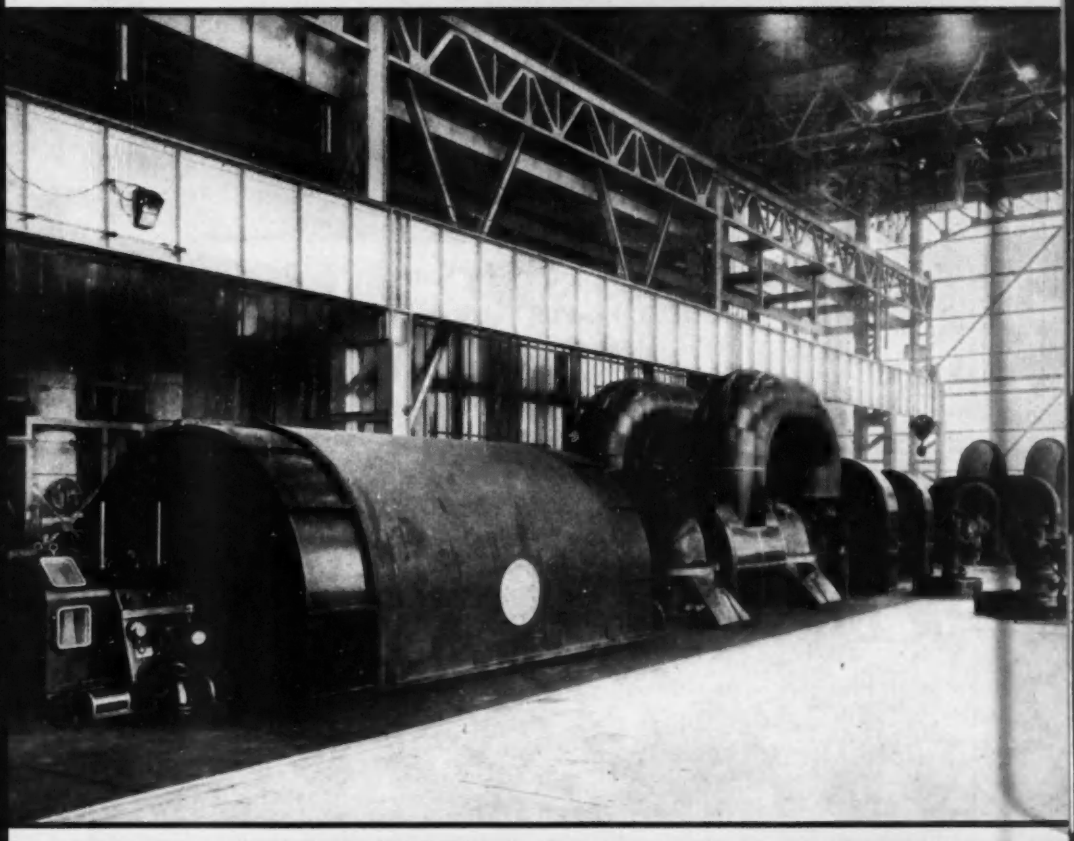

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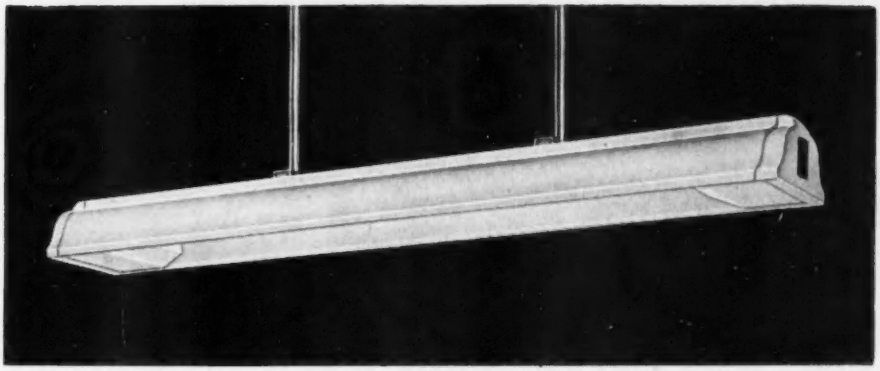

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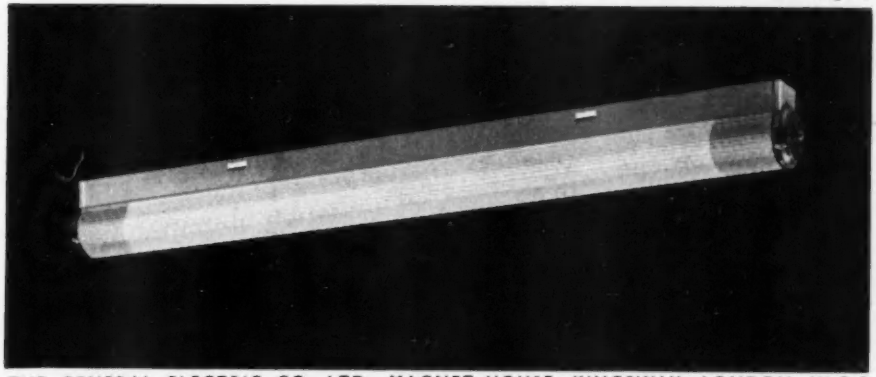

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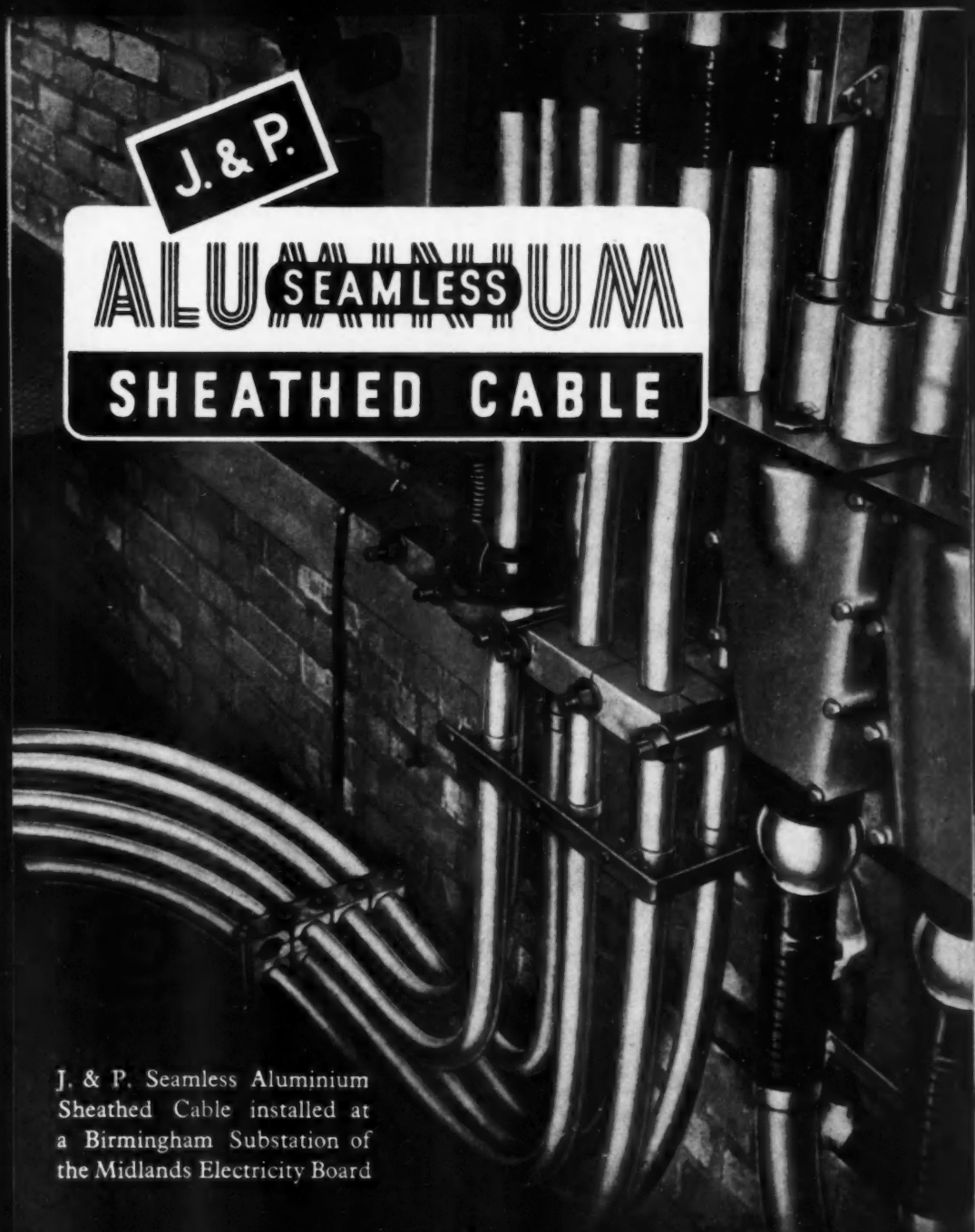

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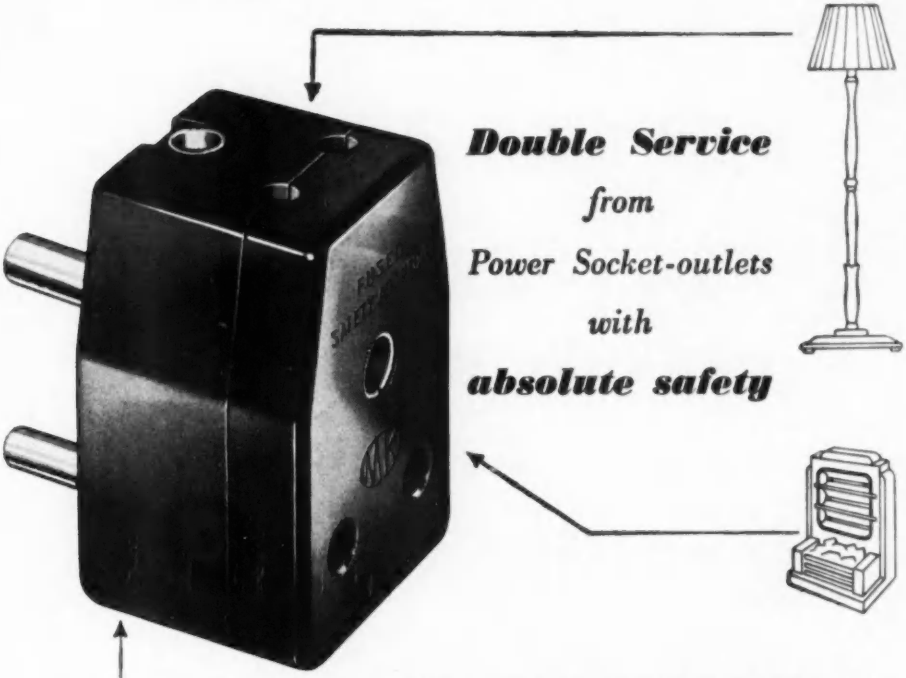

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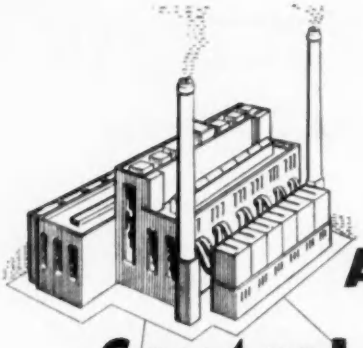

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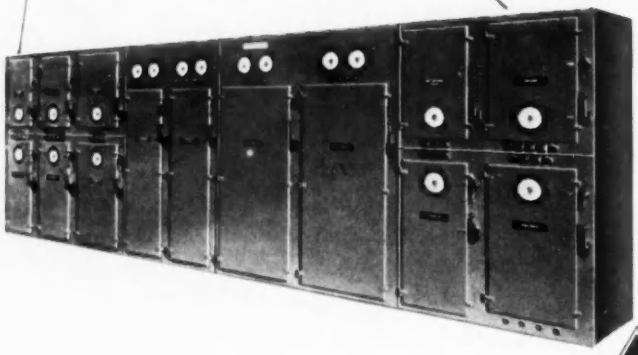

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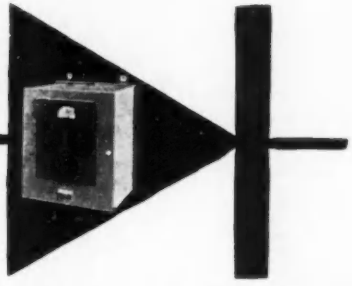

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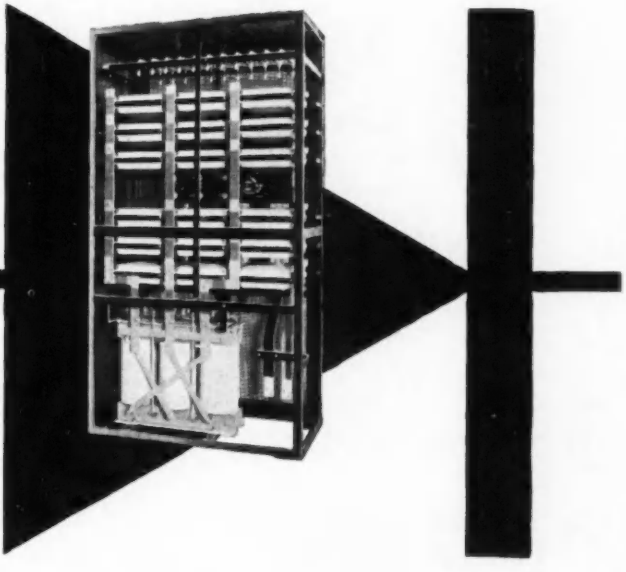

Top illustration: Automatic Battery Charger

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ELECTRICAL TIMES

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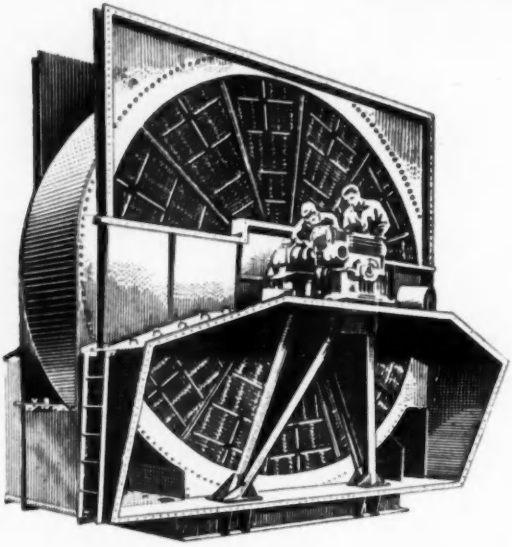

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Editorial

SETTING FOR EUROPE'S GRID

THE integration of European power networks on an international basis has long been recognised as embracing three fundamental problems, technical, economic and political. Of these, the first presents no inordinate difficulty, while the second should be capable of solution when the postwar shortages are fully overcome. It is the difficulty of achieving an international political accord which makes difficult the development of a power grid on a Continental basis. In the past week the striking proposal of M. Schuman for a common control of the iron and steel industry offers a new and realistic approach to Continental collaboration. It is too early to see what results will come from this suggestion, but should the scheme reach fruition, it is impossible for it not to have repercussions outside the immediate field of iron and steel. Right across the path of further international co-operation lies the problem of co-ordination of power sources, and given the right atmosphere of approach, other difficulties could be reasonably resolved. This past week, therefore, may prove to be a turning point in the evolution of a European grid and with it perhaps something greater, an end to Europe's internecine history.

FORMULA FOR EFFICIENCY

IN an article in a Sunday paper reviewing the management of state industry, a former chief accountant of a nationalised organisation makes a number of suggestions for improving the efficiency of such industries. The trends which he criticises are unfortunately to be detected in the supply industry today, but the remedies he suggests would be most difficult to implement. The most intriguing of them visualises the payment of management by results. But what results? In our own industry it is almost impossible to find a single adequate criterion, and most difficult to determine a sound basis of assessment. An obvious factor, energy sales, is affected only to a small extent, in the short run, by energetic management, and profit would be largely a matter of how far the monopoly position dare be exploited. Nevertheless we feel that the determination of some formula for efficiency, particularly at district level, is essential if the competitive spirit is to be reintroduced into the industry. Its value would be, not so much as a basis for payment to those men, who will in any case carry out their work conscientiously, but as a means of assessing ability for promotion and of weeding out the unsuitable. We do not underestimate the difficulties in setting up such a standard, but would urge that it is a problem that must be tackled, and tackled promptly, if the industry is to survive as an efficient organisation.

U.S. WANTS PLUS GOODS

THE views of the President of the International General Electric Company are always worthy of attention but with the present stress on dollar exports his opinions on international trade demand the closest consideration. In his address to the American Chamber of Commerce of London last week, Mr. W. R. Herod put forward the viewpoint of what he termed the ordinary American business man. He said there was general recognition of the need for a readjustment in America's external trading policy towards a better balance. He was confident, also, that this could be achieved by other countries selling to the U.S. what he termed "plus"

goods; goods which offered something different from those available from home producers but which conformed with American taste. He made it quite clear that there would be no welcome for goods competing directly with home products solely on a basis of low cost made possible by a lower standard of living in the countries of origin. From his remarks it was clear that there is a grave fear in business circles that if the customs door is opened too wide it will let in undesirable competition. This is a very natural fear and is one that is not unknown in Great Britain. We know also that some competition of this type is inevitable in free trading conditions. Nevertheless, it should be our aim to give the maximum reassurance on this point. Only by allaying these fears is the door likely to be opened wide enough to permit the ultimate achievement of a dollar balance.

COLD WATER ON HOT MOTORS

ADVOCATES of smaller machines using high-temperature insulation will do well to study the opinions, reported elsewhere in this issue, of Mr. R. H. Robinson, insulation engineer of the G.E.C., who points out the considerable difference between what is technically possible, and what is really worth while. "Hot" motors are justifiable where space or weight limitations necessitate a small machine, or where a predominant acceleration loading requires the lowest possible rotor inertia, although in traction work increased power losses may nullify even this advantage. For generation, there is little to be gained by increasing operating temperatures on account of resultant reduced efficiency, while in the case of large turbo-alternators, temperature limits are already fixed by the rotor windings which even now need special winding methods or silver-alloyed copper, to prevent troubles due to conductor shortening. This does not mean, however, that there is no future in high-temperature insulation—far from it. The ability to withstand high temperatures without damage is vitally necessary in many applications. It would be—and one day will be—a normal attribute of every motor sold, irrespective of its duty or application. But it does mean that the motors one has seen operating at freak temperatures will remain "specials." The standard motor of the future will be able to withstand trouble, but will not be looking for it.

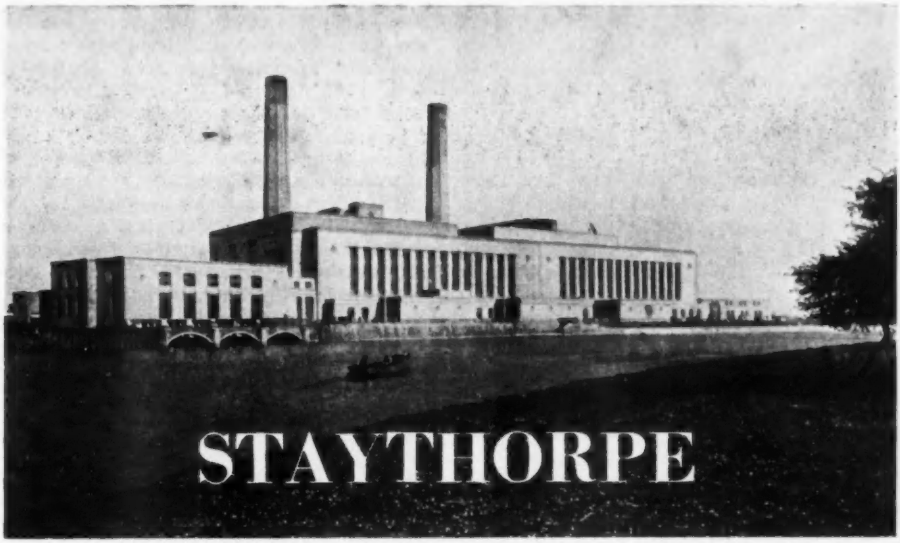
WHY NOT TRANSFORMERS?

THERE seems, however, to be a case for raising the operating temperatures of certain types of transformer. This would hardly apply to large transformers where cooling is already a complex problem, and the second place of decimals in efficiency figures is significant. Small distribution transformers, particularly in rural areas, appear to present quite a different problem. Here full-load efficiency is relatively unimportant, but first cost and all-day efficiency matter a great deal. By cutting down on the copper it should be possible either to reduce first cost or, to provide more iron for the same overall cost, thus reducing the iron losses which, presenting a constant load, are considerably more important. Any such charge would raise the problem of oil performance under high temperatures.

ELECTRICAL EXHIBITION?

ONE of the perennial subjects discussed in the electrical industry is the desirability of having our own electrical exhibition. This topic seems regularly to bloom about the time of the B.I.F. when those many dissatisfactions with existing conditions have an opportunity of coming to a head. The very universality of electricity results in there being many exhibitions throughout the year at which manufacturers find it desirable to be represented. The greatest spur to consolidation in a single electrical exhibition is the excessive cost of exhibition stands. It is this, no doubt, that has led to the sounding of opinions that is at present taking place on the desirability of some such exhibition either permanent or periodical and of the form it should take.

Meteor



STAYTHORPE

Centralised Control a Feature of this New 360 MW Station

IN July, 1946, work began on the erection of a power station at Staythorpe, on the west bank of the River Trent some three miles south of Newark. By March this year, the first set was completed and began generation. This—for these days—speedy progress was aided by the good soil conditions, and the modern technique of producing the reinforced concrete beams and blocks on site.

The site itself is particularly favourable for electricity generation. Exceptional water supplies for circulating water are readily available and there is abundant and cheap coal obtainable from the nearby East Midland coalfield. For these reasons the decision has been taken to build ultimately two similar stations, each of 360,000 kW capacity on the site.

Of these the first station, described in this article, is to contain six turbo-alternators each rated at 60,000 kW, and 18 boilers, each of 240,000 lb/hr maximum rating. The turbo-alternators will be in line, the turbine house running parallel to the river, and three boiler houses will be built, the firing aisles running at right angles to the turbine room.

Particular care has been taken in the architectural design to produce a building which, while of necessity functional, is yet pleasing to the eye and in harmony with the general surroundings, and the building, steel-framed and clad in a sand-coloured brick, provides ample facilities for operation and maintenance.

Each turbo-alternator will be fed on the unit system from a group of three boilers, although interconnection facilities are available to enable emergency working between adjacent units to be carried out. Generation voltage is 15 kV at the alternator tail-ends, and this is stepped up to 66 kV by directly-connected 75 MVA water-cooled transformers for Nos. 1 and 2 sets, and to 132 kV for the remaining units. The appropriate h.v. switchgear is of the outdoor type and is erected in substations flanking the approach road.

The reason for the different output voltages is due to the fact that Staythorpe is connected to the East Midlands Area Board's 66 kV-system by two 66-kV circuits which provide interconnection with Spondon generating station, and to the B.E.A.'s 132 kV-system by a double circuit 132-kV line to Corby. Two future lines at 132 kV will be built, one to Grantham and one to Neepsend (Sheffield). The latter line is being constructed for future operation at 275/300 kV. Interconnection between the two systems of 66 kV and 132 kV is provided at the power station by two inter-bus transformers each rated at 60 MVA.

Turbo-Alternators

The turbo-alternators being installed are B.T.H. two-cylinder dual-exhaust machines running at 3,000 r.p.m. The steam enters between the h.p. and l.p. cylinders and flows

outwards through the h.p. side, being transferred to the centre of the double flow l.p. cylinder by overhead pipes. Thus the governor gear and tachometer are driven off the l.p. end of the h.p. shaft.

Four stage feed heating is employed, the final feed water temperature being 357° F, and each machine has both electric and steam driven feed water pumps, automatic transfer from electric to steam drive being provided in the event of failure of the electric pump.

Unlike several of the sets recently commissioned in other stations, direct driven exciters are used. An unusual development is that as the station is designed for possible two-shift working, the rotors of the alternators can be heated from a separate generator to enable the winding temperature to be maintained during shut-down periods. This is expected to eliminate the troubles caused by plastic deformation of the end windings due to alternate heating and cooling cycles.

Although the alternators are rated at 75 MVA, conventional air cooling by external fans has been provided. The stator weight is 130 tons, that of the complete turbo-alternator being 395 tons.

Boilers

The boilers are all of the Babcock and Wilcox high-head type steaming at 240,000 lb/hr at a pressure of 950 lb/sq in. and at a temperature of 925° F. In order to ensure maximum efficiency and minimum operating cost, spreader stockers have been installed together with fully automatic combustion control. Another somewhat unusual feature is the introduction of variable speed a.c. motors for the forced and induced draught fans, which provides good flexibility, high efficiency and minimum auxiliary power consumption. The speed variation of the fans is 755/175 r.p.m., the equivalent ratings being 285/32 h.p. for the induced draught fans and 82/5 for the forced draught fans.

Ash disposal is comparatively simple as the residue left from the burning of coal on spreader stokers is far more amenable to handling than that left by, say, pulverised fuel. Again, in the interests of high efficiency the grits at the boiler outlet are collected and refired. Prat-Daniel dust collectors are installed between the economiser and air heaters to eliminate complaints of ash emission. The comprehensive soot blowing installation is hydraulically operated from a central control. All the boiler fans are installed at basement level in a bay served by an overhead travelling crane to facilitate maintenance and overhaul.

The stoker feeders themselves are eight in number per boiler and provide coal for a grate with an area of 464 sq ft. An important point which had to be considered when selecting the boiler plant was the calorific value of the fuel to be burned—10,000 B.T.U./lb. The coal size is specified as "to pass 1½ in. mesh with not more than 50% through ½ in. and at least 25% on ¼ in. mesh."

Station Auxiliary Plant

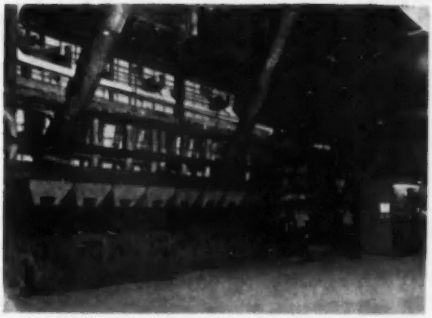
No. 1 Turbo-alternator in foreground, constructional work in progress beyond

Two feed pumps—one Harland electric drive and one Weir steam-turbine drive—are installed per set, each rated at 620,000 lb/hr. One Drysdale vertical circulating pump per set is installed, driven by a Laurence Scott variable speed a.c. motor. The pump rating is 50,000/33,000 gallons per minute, the motor being rated at 750/360 h.p. at 440/343 r.p.m. Twin type, sloping tube condensers, manufactured by Worthington Simpson, are used to give a total condensing

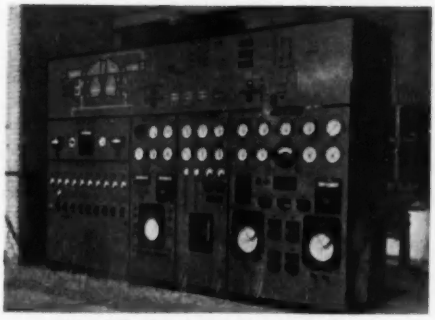
surface area of some 57,000 square feet.

An interesting sidelight on modern power station operating practice is provided by the remarkable amount of centralised and automatic control equipment. Each boiler house has its own control room, where all principal steam valves are remotely controlled, and grouped repeater dials, repeating the principal instrument readings from the individual boiler panels, give full information on individual boilers and the whole boiler house. Mimic diagrams enable the engineers to view the complete steam layout at any given moment.

The same principle has been adopted with the turbine control panels located alongside each machine, and the two circulating water control panels, each of which controls three pumps, are also located on the turbine room floor.



Front of No. 1 boiler showing spreader stokers



No. 1 Turbo-alternator control panel

Control Room

In the control room, at ground-floor level, there is, in addition to the usual electrical panels, a "station performance indicator," where in diagrammatic form the indication from the boiler house control room, turbo-alternator control and circulating water pump control panels are again repeated. Thus the control engineer is kept fully advised of conditions on the steam and auxiliary sides as well as on the electrical side. A master panel, located in this control room, also provides for emergency operation of all principal steam valves. This room, together with the adjoining relay and meter rooms, is fully air conditioned.

Fire risks inside the station have been minimised by the use of air-cooled transformers and air-break switchgear throughout, while provision against supply failure to key equipment is provided for by automatic changeover arrangements either to battery-operated d.c. or special a.c. circuits, the latter being fed from an automatic starting diesel driven alternator.

Auxiliary supplies to motors exceeding 100 h.p. are at 3·3 kV, and to smaller motors are at 415 V, the supply being taken either from the 5 MVA unit transformers or from the 10 MVA 66/3·3 kV works transformers located in the outdoor substation. Interconnection with the East Midland Area Board's 11 kV network is also provided through two 3·3/11 kV transformers.

The turbine room is served by a 130-ton travelling crane with an auxiliary 0·25-ton hoist, and a rail siding runs the whole length of the building and into a well equipped workshop at the west end. In addition, a large working platform at turbine floor level is provided for installation in the condenser well alongside the turbine to give extra floor space when major overhauls are in progress.

Staff amenities are well catered for by the provision of accommodation distributed throughout the building and, in addition, there is a well-equipped canteen with seating accommodation for 300 and with cafeteria service.

Main Contractors

Turbo-alternators	B.T.H.
Boilers	Babcock and Wilcox Ltd.
Transformers	B.T.H.
Switchgear	B.T.H. and G.E.C.
Circulating water pumps	Harland Eng. Co. and J. & G. Weir, Laurence Scott and Electromotors.
Condensers	Worthington-Simpson Ltd.
Evaporators	Aitons Ltd.
Main contractors	Balfour Beatty and Co. Ltd.
Architect	T. Cecil Howitt and Partners.

The Art of Delegation

Wider Practice is Desirable in the Supply Industry

By R. H. RAWLL, M.I.E.E., M.I.Mech.E.

NATIONALISATION of the electricity supply industry has naturally involved many changes in its pre-vesting organisation and methods of procedure, with, as a consequence, alterations to the duties, responsibilities and functions of many members of the staff employed.

This was bound to lead to a certain amount of dislocation while many individuals readjusted themselves to the new conditions. Also, this was inevitably a particularly irksome experience to those men with ideas of their own, who hitherto had been in positions of authority which enabled them to put these ideas into practice if they so desired. They naturally fretted at the check imposed upon their activities in this direction by the new organisation, but their acceptance of this curb, without rancour or discouragement, was surely the highest form of discipline on their part. The human problem, therefore, was to perfect the organisation without cramping overmuch the qualities of the individual.

Two years, however, have now elapsed since the change in ownership of the industry was effected and we should, therefore, now be approaching the end of this "teething-trouble" period. There still remains, nevertheless, certain matters which call for readjustment and modification, if full efficiency is to be achieved, and this is becoming increasingly evident as the picture of the working of the new set-up becomes clearer and actual practical experience of its operation available.

Such remedies as may be necessary in this respect are, of course, entirely the domestic matters for consideration of individual Area Boards and the British Electricity Authority, each of which has its own particular problems. The writer, though, cannot help feeling that there is one particular aspect of this question, which, just because it lies at the very root of all good administration, merits far greater attention being paid to it at present throughout the nationalised electricity supply industry as a whole. And that is the art of delegation.

It is important to emphasise the fact that the proper exercise of this particular function is most decidedly an art and by no means can be treated as an exact science. It should, however, be possible to give some indication of the general considerations to be borne in mind, and it is the purpose of this article to assist in this direction. At the same time, it must always be remembered that this art of delegation can only be acquired by actual practice and experience and not by mere theoretical study.

What is Delegation?

Now what exactly do we mean by the term "to delegate"? Perhaps, in the first place, it will clarify things if we refer to our old friend the dictionary. Here we learn that this means "to commission to act for one" or "to commit to the care of." And it should be noted that it would also seem that both of these definitions imply a complete confidence being held in the person on whom the duty is bestowed,

It is also necessary to make it quite clear that, if one delegates a duty to another person, one is not relieved thereby of the responsibility for the work so performed—in other words, one cannot "pass the buck."

There is an optimum point to the degree to which duties can be delegated. Each man must determine this for himself, bearing all the circumstances in mind. If he delegates too much, he ceases to be in the scheme of things at all. On the other hand, if he delegates too little, he cannot see the wood for the trees.

Giving Instructions

The whole matter is bound up with the correct method of giving instructions to subordinates. Here, with advantage, we may take a leaf out of the book of the Services. These organisations, of course, do not give "instructions" but "orders." In essence, however, they are the same thing. When you give a military order, you, in effect, state what you want done, but not how to do it. The guiding principle is that the person giving the order takes the responsibility for the practicability of his project and all the consequences which may arise in achieving it, but it is entirely the job of the person receiving the order to decide upon and make the necessary arrangements to give effect to it. This may quite possibly involve the latter, himself, giving orders to others, but, in doing

so, the same principle, already referred to, will still be observed.

In this way, matters, which are rightly considered as details from the point of view of one level in an organisation, and are thereby excluded from the instructions which it issues, subsequently become the substance of specific instructions emanating from those particular lower levels, where the determination of such details is really essential and of immediate concern because of local circumstances. Thus, the administrative machine is not cluttered-up unnecessarily. In other words, the general features only of the desired picture are sketched-in at the highest level, while the lower levels fill in the details and complete the painting, since they alone in their several spheres can supply the local colour.

Leadership

Another matter, with which the art of delegation is intimately associated, is leadership. Now, what are the qualities required in a leader? First and foremost, it is necessary for him to know the men he has to control and gain their confidence. It is also essential for a leader to possess a thorough experience of all phases of the work on which he is or is likely to be engaged. And, finally, he must be a man who can take responsibility and make decisions and, what is most important, he must be given the opportunity to do so.

It will be observed from the foregoing remarks how necessary it is to encourage one's immediate subordinates to take responsibility. This can never be achieved if the fatal attitude is adopted of keeping everything to oneself. Apart from a few matters which are of a confidential nature—and it is surprising how few things are really justified in having this sacred description applied to them!—the fullest possible information should be passed on. With regard to confidential matters, it is wise to take into your confidence, as far as discretion permits, the man who takes over your work when you are away. He will appreciate this action of yours and will not let you down. By adopting the above technique, one can be assured that work will continue to flow smoothly and efficiently when one is absent due to holidays, illness or business journeys. Incidentally, it is a very mistaken idea among some people that, if they do not delegate work to others, they will become indispensible in the organisation and thereby well in the running when promotion is being considered. Usually, however, they achieve exactly the opposite result. In this connection, many of us, no doubt, had the experience in pre-vesting days of having had a vacancy on our staff, for which a particular man in another position appeared to be quite suitable, but who was not given this promotion, for the simple reason that, just because he made a practice of keeping everything to himself, no one was acquainted with the details of his present work, and, consequently, dislocation would inevitably have occurred if he had been taken off his present job.

In order to develop the self-confidence and capabilities of a subordinate, it is desirable to adopt the practice of occasionally giving him work, which either involves slightly more responsibility than he previously has been called upon to bear, or else is somewhat outside his usual experience.

When a particular duty is delegated to an assistant to perform, it must be left entirely in his hands, as he will obviously be discouraged and prevented from learning to take responsibility if his senior subsequently interferes. The assistant, however, should realise that if he, himself, approaches his principal for a ruling on a specific point, this will be given and he will have to abide by this decision in future. The effect of this decision may upset many of the detailed arrangements he has made, so this will teach him to think for himself on other occasions and only ask for a ruling when it is really necessary in the circumstances.

To Each his Own Job

One should always be on one's guard against personally doing work which is really the responsibility of an assistant. This is fatal for many reasons. Once a particular job is commenced in this way, one must of necessity see it through to its conclusion entirely by oneself, which may not only involve much detailed work, but also considerable time and trouble. When such a similar job occurs in future, your assistants will rightly expect you yourself again to carry out this work. Besides, what is more important, they will think you have no confidence in their capabilities to do it.

Unfortunately, this state of affairs, of some senior men themselves doing too much detailed work, exists in the nationalised electricity supply industry. How this originated it is not hard to seek. Many men, who in pre-vesting days held managerial positions in electricity undertakings, were appointed to senior posts on nationalisation, but, despite the fact that it had been their previous practice to delegate many of their functions and duties to others, they soon found that, under the new set-up, through force of circumstances, they were adopting this pernicious "do it yourself" technique. The reason for this was the following.

A considerable number of these new senior posts in the early days of nationalisation had little or no subordinate staff available for their use, or else the pre-vesting staff were largely dispersed to other offices, etc., on the "General Post," which accompanied the splitting up of the industry into "Generation" and "Distribution" and their concentration within Divisions and Area Boards respectively. Such seniormen were being pressed continuously from higher levels for detailed information, etc., on a variety of topics, the obtaining of which was essential to develop the new organisation. Their subordinate staff, due largely to the dislocation of duties already referred to, in many instances were unable to deal with this particular work effectively without being considerably supervised. The senior men, in such cases, on account of other pressing duties, usually had not the time available for such detailed supervision. Many of them, therefore, true to their traditions in the industry and their loyal desire to make the new regime work efficiently, in order to get things done quickly and satisfactorily, often did them personally themselves, involving much detailed work on their part, which normally would be done by their subordinates. Thus, this bad habit grew up and, once established, it is hard to break. In consequence, quite a number of men in responsible positions continue today to act in this way, although with the good intention that they are helping the industry along, when all the time it is having a most deleterious effect on the staff which they control, and thereby, also, on the efficiency of the organisation as a whole.

Effect of Size

It is, of course, true that the larger the concern the more difficult it becomes to practise the art of delegation, due to the standardised methods and procedure which large-scale organisation inevitably entails. On the other hand, the lack of a proper degree of its use can have more serious consequences in a large organisation than in a small one, particularly if it is not sufficiently exercised at the higher levels, as the detrimental effects will be felt throughout the whole staff structure below such levels. If in pre-vesting days a particular electricity supply undertaking was unfortunate in that its management did not adequately delegate duties and functions, the disadvantages which this created were solely confined to that undertaking, which was only one of several hundreds throughout the country. Nowadays, however, with far larger administrative units in existence, a similar state of affairs can, obviously, have correspondingly wider effects.

From a consideration of the above remarks, the writer hopes that he has established his contention that far greater attention should be paid to this question of the art of delegation, if maximum efficiency is to be achieved in the nationalised electricity supply industry. Now, how are we going to set about it? It is essentially a personal and individual matter. No orders, instructions or directives from above can bring this about automatically. Only the individual himself can decide whether and to what degree he will delegate matters. All, however, throughout the organisation, from top to bottom, providing they control staff, can help.

Example Needed

Those of us, who were managers of electricity supply undertakings in pre-vesting days, have a particular responsibility in this connection, since we should show, by our personal example, to our present subordinates the decided advantages to be gained to all concerned by the proper exercise of the art of delegation. This may, in present circumstances, require a conscious effort on our part, but, after all, we must not forget that we had already gained and brought with us into the nationalised industry actual experience in delegating matters, whereas many of those, whom we now control, have had little opportunity to exercise this particular function. As these men, no doubt, will occupy more senior positions in the future, it is up to us to give them the chance of learning all the qualities of leadership, which, of course, includes the practice of delegating matters to others.

The Chairman of an Area Board recently remarked, publicly, that one of the greatest needs of the electricity supply industry at the present time was for skilled managers and administrators. Ability in delegating things is, of course, an essential and important qualification of men in these categories.

In this connection, it is somewhat strange that, although, as far as the technical side of their work is concerned, most engineers recognise the necessity of never ceasing to acquire fresh knowledge and are always ready to study new problems, yet, few adopt the same enthusiastic attitude towards that aspect of their duties which involves matters of management and administration. With the numerous changed conditions, which have resulted from nationalisation, it is of the utmost importance, both in their own interest and to the benefit of the industry, that they should pay more attention to these matters. In so doing, they will find abundant opportunities to practise this important art of delegation, to the advantage of all concerned.

Our readers' views . . .

Contractors

UPON studying Mr. F. A. Sclater's article on estimating it is apparent that the architects' distaste for the electrical contractor is based upon ignorance.

There is no textbook or other dogmatic source from which one can glean sufficient knowledge to efficiently carry out either estimating or installation work. The ability to do so is a happy combination of experience, craftsmanship and *un*common sense which the mere possession of the National Certificate or similar stereotyped academic qualification does not confer upon the holder. . .!

As a working electrician at National standard I can form an opinion, after experience on both sides of the theoretical fence between "technical" and "manual" worker.

Having held a responsible test position on h.t. switchgear I now find myself back in a manual grade—a despised "contract electrician"; but problems are constantly cropping up which would completely baffle my former colleagues, many of whom were at Higher National and B.Sc. standard.

Mr. Sclater's article shows how wide is the scope for originality and initiative in electrical contracting despite the contempt in which it is held by the "intellectuals," now mass-produced at our technical colleges and universities. For them, the satisfaction of co-ordinating hand and brain in craftsmanship can never be.

It is time the industry respected the important role played by the craftsman, and the urgent necessity of the student spending twice as long in the workshop.

F. H. Adams

BOGNOR REGIS

◆ ◆ ◆

Talking Without the Book

AS one who has, with little effect, battered against the widespread use of scripts in public debates, I was very interested to see in "Meteor's" notes some reference to this.

For many years I was a regular visitor to the E.D.A. Sales Conference and it was a continual source of surprise to find those taking part in a so-called discussion had to recite their piece from typescript. Quite how this type of salesman could hope to deal with questions on a consumer's premises if he was without his "book of words" I fail to grasp.

I fear, however, it is a hopeless project because the worst offenders are at the institutions where the discussion on a paper usually results in the reading of several associated papers and although I believe that the chairman may ask a speaker to refrain, it is scarcely likely to happen.

However, I entirely agree that in the final for the E.D.A. competition it must be of great assistance to the judges if the finalists had to give both a prepared and an extempore address.

Alan N. East

ABBOTS LANGLEY

◆ ◆ ◆

North Wales Hydro Power

IN view of the controversy existing about hydro power in North Wales, I feel as a domestic consumer in that area that one of the main deciding factors should be the relative change in cost of power per kWh that both the suggested types of plant would have on the consumers in the area.

As for the eyesore point of view, surely the proposed hydro plant would be more pleasing to the eye than either the steam or gas turbine plant.

I. B. Lloyd Jones,
Student, I.E.E.

BIRMINGHAM

◆ ◆ ◆

A Misunderstanding

FURTHER to Meteor's note in your April 27 issue headed, "Never Too Old To Learn," I object strongly to the remark, "We are an imitative race, and more inclined to follow the ways of others than to take our own line in this country," not merely because it is a complete reversal of the truth, but because it builds up a dangerous inferiority complex.

Albert Morgan,
M.I.E.E.

LONDON, N.W.5.

(An unfortunate mistake occurred in this paragraph. This should have read "our own line of country" and the race referred to was the human race and not the British. We apologise for the implied slur on our own compatriots.—Ed.)

U.S. fears cut-price Imports

TO those interested in selling goods to the U.S.A., we would commend a study of the address given to the American Chamber of Commerce of London by Mr. W. R. Herod, president of the International General Electric Co. of America. After a review of the world position and the political polarisation of world economy, he pointed out that American foreign trade had varied cyclically with domestic prosperity, and its level had progressively decreased in its relation to the gross national product.

The satisfying of the world's post-war demand raised America's exports from some one-seventh of the pre-war world exports to a peak in 1947 of almost three-eighths. As related to the gross national product, U.S. exports rose to 1·8 times the pre-war relationship and even now is some 1·4 times. Imports, however, expanded only in proportion to increased economic activity. It is this trend, combined with capital flight, that has drained the world of dollars.

Future prosperity would appear to depend upon a revival of international investment flow, increased production and wider dispersal of production facili ies. Mr. Herod, however, did not think that there would be much U.S. private investment abroad; the inconvertibility of currencies discouraged this, but he believed that private investments would again flow from Britain, and Britain's banking experience, managerial and technical talent might be exported sooner and more extensively than expected.

Although, if improperly handled, additional exports could be a disadvantage to the U.S., in his opinion selected imports could be successfully cultivated through the introduction into the American market of goods meeting what the American wanted but different in style, or quality, as compared with America's own products. To compete only with a similar article, at a lower cost, based on a lower level of wages, would not, in Mr. Herod's opinion, yield a happy or permanent solution to the problem, but there was a real opportunity for the foreign exporter who offers what was wanted as a "plus" item. Referring to the Seattle tenders, he stressed that certain specific requirements were called for, and competing tenders at lower prices, both British and American, were rejected for not meeting the specification.

Ordinary American business men appreciated that the level of imports into the U.S. should wisely be increased, but as competitors they were naturally going to compete as hard as they could. The American house as well as the British must be kept in order, for it was only by co-operation with the Western powers having similar ideas, that future prosperity could be achieved

Heaviside Centenary

OLIVER HEAVISIDE was born one hundred years ago today. Students of electrical engineering know of him as the inventor of a more readily used than understood method of calculus—the operational calculus, while the general public thinks of him, if at all, in connection with one of the layers which it meets in its general science reading. Yet, in his life, Heaviside covered a very wide range of subjects, including practical telegraphy and the basic ideas of alternating current analysis.

The son of an artist, his only known connection with electrical engineering was through Sir Charles Wheatstone, a maternal uncle. It was probably on account of this family connection that Heaviside began work, at the age of 18, as a telegraphist, working on the then recently laid Anglo-Dutch cable. His early experience was in the testing of transmission speeds, and later, when he came to Newcastle, he gained practical experience in fault location.

His first scientific paper was published in 1872, and like many of those that followed in the 1870s, it was concerned with electrical measurements. Practical telegraphy was also represented during these years, duplex working forming the subject of one of his earliest articles in the Philosophical Magazine (P873). In the same year he first saw Maxwell's "Treatise on Electricity and Magnetism" and much of his energy in after-years was devoted to interpretting Maxwell's electromagnetic theories.

In 1874, Heaviside joined the Society of Telegraph Engineers, and also left his employment to devote himself to research and writing. Most of his original research work was done in the next 13 years.

Recognition of Heaviside's work was slow to come about, but in 1891 he was elected a Fellow of the Royal Society, and in 1896 awarded a Civil List Pension by the Government. The honorary degree of Ph.D. was conferred by the University of Gottingen in 1905, and in 1905 was elected an honorary M.I.E.E., the American equivalent following in 1918. In 1921, he was the first recipient of the I.E.E. Faraday Medal.

Keen Competition the Keynote at B.I.F.

Intensive sales drive a noticeable feature of the 1950 British Industries Fair at Castle Bromwich, Birmingham

THE general impression gained during the first few days of this year's Fair at Castle Bromwich was that sellers are now getting down to the job of selling, instead of having, as in past years, to keep an eye on availability and delivery dates. Some branches of the industry, admittedly, have order books well filled and can only accept long term orders, but in others, the seller's market has completely collapsed, and in these cases there are signs of intense competition as before the war.

On the home market, the drying up of ready money which has been a prominent feature of the last year, has obviously had repercussions. Wholesalers are naturally reluctant to place orders for goods for which there does not seem to be a ready market, and in consequence will only purchase items which have a definite selling point, or which result in tangible and immediate economies. In the domestic field, for example, the electric washer which results in an immediate reduction in, or elimination of, laundry bills is still a most attractive item and the market is well able to absorb the production. On the electric cooker side, however, the home market is to a certain extent restricted to new homes and to replacement, and this is reflected in the demand shown.

Attendances

On the first day of the Fair many comments were heard as to the small number of visitors. In fact, a somewhat greater attenddance than last year was recorded. Overseas buyers on the two opening days totalled 723 as against 551 last year, while home buyers were 5,624 as against 5,149 for 1949. Despite these figures, however, the general opinion was that the Fair was unusually quiet, although it was thought probable that the business transacted would improve towards the end of last week and during this week.

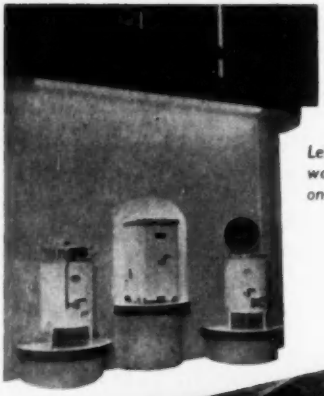
Opening Speeches

On Monday, May 8, Mr. Attlee proposed the Toast of the British Industries Fair at a dinner held at the Mansion House, and in the course of his speech said that he considered there were grounds for "reasonable and cautious optimism" regarding the nation's economic situation, and stressed the need for greater dollar exports. Mr. Harold Wilson, president of the Board of Trade, also spoke referring to the export capacity of the British heavy engineering industry.

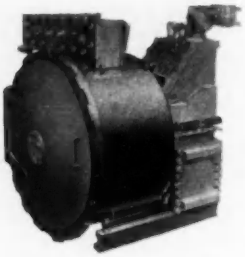
On Tuesday, a luncheon was held at Castle Bromwich under the *aegis* of the Fair Management at which the British Electrical Development Association and the British Electrical and Allied Manufacturers' Association were represented. The chairman of the Committee, Mr. Walter Higgs said the value of the electrical industry's exports had increased six times since 1938, without including the large amount of electrical equipment which was exported as an integral part of machine tools and other machinery. The automobile industry's export success was a "flash in the pan" but the world was starved of large electrical plant and the demand for it would continue for many years ahead.

Mr. G. L. Wates, chairman of the B.E.A.M.A. Council pointed out that the export trade was

A general view of the electrical section at Birmingham

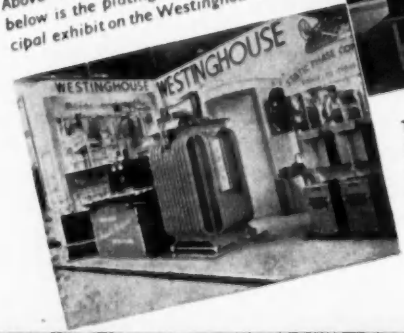


Left: Washers and washboilers seen on the Burco Stand

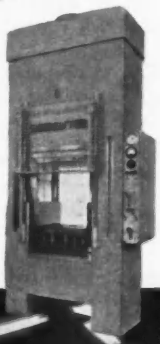


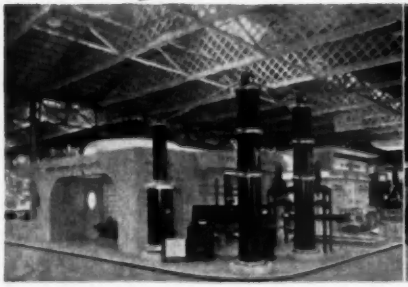
Above is the 33 kV flame-proof contactor unit which forms an effective cornerpiece to the B.T.H. stand

Above is the "Brush" stand, while below is the plating rectifier, the principal exhibit on the Westinghouse stand



This display of Baby Belling cookers above, caught our eye, as did the giant B.I.P. moulding press on the right





Two other effective displays were Standard Telephones' h.v. d.c. test plant, on the left, and Revo's range of cookers on the right

based on home trade. Unless the home market would continue to assist in the purchase of electrical equipment, it would be difficult to support the export trade which was so vital. He thought that Marshall Aid had been a bit of a disaster for the country. If we had tightened our belts and taken our medicine immediately after the war, he thought the position would have been much easier now.

Mr. S. F. Steward, chairman of the S.W. Electricity Board, said there was enormous scope in Britain for industrial electrification. Britain was still in a poor position relative to the United States in the amount of h.p. per man, in industry. It was intended to encourage the development of electricity, in industry in homes and on the farms to the fullest extent.

On Friday, the Institute of Export held an Export Gala at the Empress Hall, Earls Court. Mr. Leslie Gamage, president of the Institute, welcomed the guests, particularly those who had come from overseas. Among the distinguished visitors were Sir Stafford Cripps and Mr. Harold Wilson. Sir Stafford Cripps, who replied, said that the exhibits at the B.I.F. lay before visitors the products of recovery. He pointed out that many overseas visitors had expressed great pleasure in the fact that our salesmanship and sales methods had greatly improved. Over 11,000 overseas buyers from 120 countries had visited the Fair, an increase of 10% over last year, and buyers from U.S.A. were 50% up.

Castle Bromwich Items

The Fair at Castle Bromwich strikes the visitor as being much brighter and better set out than last year. Many of the larger firms have concentrated on showing in detail two or three attractive lines instead of endeavouring to exhibit in the restricted stand space available the complete range of their products.

An item causing considerable interest, particularly among the younger generation, is the B.T.H. demonstration of electric train control, where a small model electric Underground train, running on a circular track, is shown, controlled by a full-scale set of electro-pneumatic traction equipment. Railway equipment for signalling purposes is also being shown at the adjacent stand of Westinghouse Brake and Signal Co.

Most prominent item in the electrical section is the English Electric single-phase unit of an air-blast circuit-breaker for 165 kV duty. This item towers into the roof girders and is probably the most imposing single item in the Fair.

Associated with this stand is a new portable insulation tester based on electronic principles to give a d.c. output of 500 to 10,000 V d.c., the short circuit current being limited to 0·5 mA. The resistance ranges cover from 50 to 250,000 megohms, and the error is less than ± 5% up to 2,500 megohms and ± 10% up to 100,000 megohms. The unit only weighs 23 lb and the size is 15 in. by 10½ in. by 6 in.

Motors

As in previous years those companies engaged in the production of motors are showing an excellent selection of their products. Higgs Motors have an array of typical machines from ⅛ h.p. up to 250 h.p., including a special 180 h.p. squirrel cage type with a high starting torque of 80-100% at a starting current of only 1·75 times full-load. Crompton Parkinson show motors from the "Minors" of ⅛ h.p. up to a 130 h.p. motor and an 80 h.p. auto-synchronous motor with overhung exciter.

The concentration on industrial mill electrification is exemplified by the interchangeable loom motors of G.E.C., and overseas dollar earning machines to American and Canadian specifications are being featured by both Brook Motors and Newman Industries. A new form of light-weight construction is being shown in the machines being produced by Tilling-Stevens Ltd.

Electronic Control

Most of the electronic controls on view are for the control of motors for continuous process work. English Electric have produced a unit mounted in a circular case, so that the control assembly may be rotated to give easy access to the component items for replacement and servicing. Several of the controllers can be used as automatic servo devices, being fed with information from the product concerned and then applying the necessary correction. One of these by Electric Construction Co., is for drying cloth, the speed of the cloth through the dryer being controlled by the moisture content of the cloth. Another servo application by Metropolitan-Vickers is on an automatic arc welding machine where the electrode feed is controlled by the length of arc to keep a consistent weld and a stabilised arc.

Welding equipment is as popular as ever. Apart from the M.-V. machine referred to above, resistance welding machines are being displayed by B.I. Callender's Cables Ltd., and a balanced three-phase spot welder by Sciaky Welding Machines. Argon-arc welding is demonstrated on the stand of the Arc Manufacturing Co. and stud-welding is featured by both Crompton Parkinson and Cyc-Arc Ltd.

Power Control

The control of large quantities of power is dependent on switchgear and the auxiliary operating and protective equipment. On the h.t. side is the English Electric equipment referred to before; a 33 kV outdoor breaker by Reyrolle, and a 66 kV outdoor circuit-breaker by Ferguson Pailin. Protective gear is being shown by Reyrolle who have an illuminated panel to illustrate the use of the "Duo-bias" system of transformer protection and also are showing "Solkore B" feeder protection.

Remote control of power systems is well shown by the Standard Telephones and Cable Company's demonstration of the actual control panels being shipped to the North of Scotland Hydro-Electric Board. This item is a "working" unit, being set up to show the actual operation and the indications which can be transmitted back to the control room from the two remote stations under control.

High Voltage Gear

Also on the stand is a d.c. high voltage test rig for use in development work on supertension cables and associated equipment, and also for charging impulse generators. This item uses SenTerCel selenium rectifiers, built up as 100 kV half-wave units. It is proposed to standardise these half-wave units for use in a range of equipments employing one two or more stages of rectification.

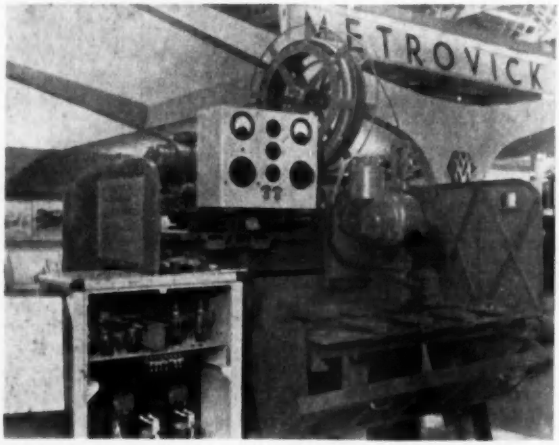
Another high voltage exhibit is shown on Ferranti's stand and consists of a model Marx type impulse generator which is capable of being operated to give a 3 to 4 in. spark.

Sectionalised 110 h.p. motor forms focal point of Brook Motors' display

In considering the cooking equipment exhibited, the range of domestic appliances does not indicate any radical change from last year's exhibits, although many minor points of detail have been improved and alterations introduced to ease production and assembly. Parnall (Yate) have introduced a new type of thermostat which allows for a rapid initial heating period to bring the oven up to temperature as quickly as possible, and when temperature has been attained, regulation is carried out by a comparatively light loaded element. Jackson have introduced several minor modifications, mainly in connection with styling, to the "Cleanline" series, and Revo have now extended the "Princess" line to five different models to give a series of different combinations of hot plates and grills.

Although there is a feeling that the market for the miniature cooker is now passing, the demand still remains strong, and many firms are showing miniature or table cookers. The well-known "Baby Belling" is being shown in a new version and Revo has a "Peerless" model incorporating a 2 kW grill-boiler, and a fair-sized oven loaded at 900 W. An unusual feature is a switching restriction whereby although the total loading is 3·9 kW, not more than 3 kW can be used at one time. Thus the unit can be plugged into a standard 13 amp or 15 amp socket without trouble. The Jackson "Giant" now has an auxiliary stand with a saucepan shelf which can be used alternatively as a hob-cover.

Washing machines are in gen-



Electronic control for arc welding is an interesting item on the Metrovick stand

Many visitors have found interest in this model Ferranti impulse generator

eral the same as those shown last year. A new unit, however, is the "Servis" round type made by Wilkins and Mitchell which is a low priced machine embodying all the main features of the cabinet model.

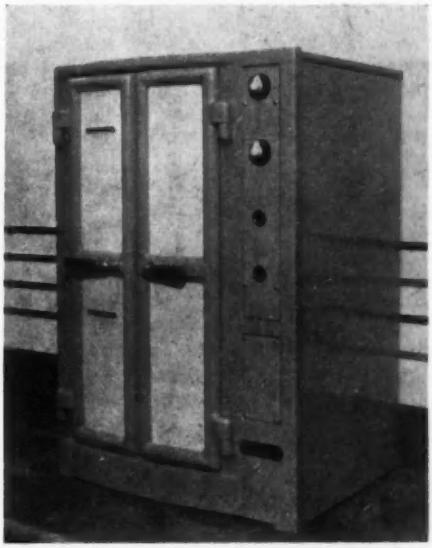
Certain firms are making a direct attack on the American market. Berry's Electric Ltd. have produced a number of electric fires with or without heating elements, to give a "fireside" effect in the centrally-heated American home. The company has opened a showroom in New York for the sale of these items. Morphy-Richards have designed a fully-automatic toaster, silent in operation for the same market and which has had a good success in Canada. The Parnall (Yate) cooker referred to before is also designed to conform to American and Canadian standards.

Heating equipment generally is not in great evidence. Belling are showing several models of convectors, and the Ekco "Thermovent Series" are well illustrated. Immersion heaters are being shown by Hotpoint, and the Rheostatic Co. has a comprehensive layout showing the application of controlled heating to large blocks of flats and offices. The Berry immersion heater which uses an embedded type element has now been redesigned to conform to the appropriate British Standard Specification.

Cleaning appliances are featured by Hoover Ltd., and electric floor scrubbers and polishers are shown by Columbus Ltd., R. G. Dixon, F. Gilman, and Morphy-Richards. The last named firm are showing the "Simon" which is claimed to scrub, wash wipe and dry 3,000 sq ft of floor in one hour.

Distribution

A large quantity of distribution equipment for heavy power work is being shown by several firms. Johnson and Philips are showing a range of aluminium sheathed small diameter cables which can be used for ordinary domestic and commercial wiring. They are also demonstrating, on the C.M.A. stand, the technique for jointing and plumbing the larger ranges of aluminium sheathed cables. Power Centre Ltd. has a comprehensive array of equipment for use with the busbar trunking system of distribution of power for large factories and works. Of particular interest are various items to be used in the heavy power distribution system to be installed in the new Vauxhall works at Luton. Many wiring accessories are being shown by Metway Electrical Industries Ltd., who show a new switched socket outlet with three-pin plug, and who have, incidentally, entered the pressed steel conduit fittings field. Barries Electrical Agencies are showing "DexRay" distribution switches and switch fuses for currents up to 100 amp.



A hot cupboard which is drawing the attention of visitors to the Jackson Electric Stove stand

Meters and instruments are being exhibited by Sangamo-Weston, who show multi-range test instruments and substandard instruments.

Ferranti are displaying the F. M. watt/hour meter which they have recently introduced, and Metropolitan-Vickers have a meter testing assembly complete with a substandard meter in a perspex case to enable the internal construction to be examined. Also shown on the M.-V. stand is a highly stable power unit to produce 250 mA of d.c. current at voltages between 660 and 680 V. A potential divider allows the voltage to be varied in steps of less than 200 mV from zero up to full voltage. The maximum drift over ten minutes is 4 parts in 100,000; the maximum drift over 1 hr, 1·5 parts in 10,000; and the output ripple is about 2 mV r.m.s. The stability of the output is good, being virtually unaffected by rapid changes in voltage.

Radio Frequency Heating

In previous years, a large amount of induction and dielectric heating equipment has been on view, mainly as a result of the post-war attention paid to the use of plastics and plastic materials. This year, however, not so many of these items are to be seen. English Electric are, however, showing a 5 kW production induction heater, and a 2 kW dielectric heater; and Radio Heaters with their 1, 5 and 8 kW induction heaters.

EVOLUTION IN SWITCH DESIGN

MOST widely used of all electric switches is undoubtedly the 5 amp, 230 V tumbler type lighting switch, and, merely because of its common use, the construction and operation of this type of switch are often taken for granted. It is interesting, therefore, to come across a modern switch designed *ab initio* for 230 V, 5 amp service, involving the minimum of component parts, operating on a simple, reliable principle mechanically, and possessing excellent electrical qualities. This is the Rolls switch made by Rolls Switches Ltd., of 154/6 Blackfriars Road, London S.E.1. Fundamentally, the switch consists of five component parts, a moulded base plate on which the fixed and moving contact assemblies are mounted, the two assemblies themselves, a moulded operating dolly and a cover plate. The main design point of importance lies in the construction of the moving contact assembly shown in Fig. 1. This is of beryllium copper, and provides the support for the actuating dolly, carries a solid silver contact, and also gives the necessary "snap" and rubbing actions at the contact points. The sectional sketch in Fig. 2 shows the operating action. As the dolly is raised the centre tongue of the contact assembly is pushed downwards to give a slight rubbing action at the contact points, simultaneously the pressure exerted by this tongue to increase the contact pressure is removed, till, at a critical point, a reverse flexing action takes place and the contacts separate. Owing to the spring pre-stressing, this separation occurs at a constant speed irrespective of the speed of operation of the dolly. The action is, however, positive enough to ensure freedom from contact bounce.

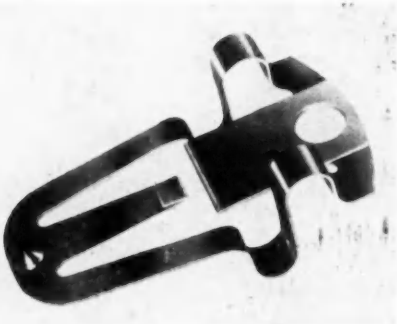


Fig. 1—Moving contact spring assembly

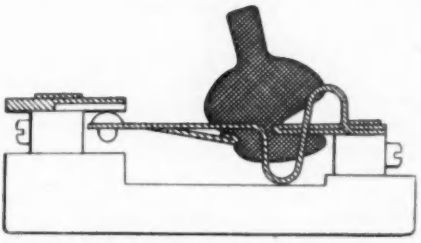


Fig. 2.—Section of switch to show action

The fixed contact is made of phosphor-bronze with an inset of solid silver about 0·016 in. thick. As can be seen, the assembly of the switch is extremely simple, and the reduction of labour costs for this work makes it possible to use beryllium-copper and silver and market the switch at a competitive price.

Tests taken at the N.P.L. have shown that over 4,000,000 operations at 5 amps are well within the capacity of the switch, without mechanical or electrical deterioration.

Problems and Practice

IN ENGINEERING

Flickering Lamps

RECENTLY, while installing additional power points in a house which was undergoing alterations, the lights started to flicker and sometimes go right out. The flicker was traced to some new copper waterpipes (as yet unused) which were touching a cold water main. When they were parted the lights went out. From this we assumed that neutral was broken and earthing somehow on to the copper pipes.

After a lot of investigation this was what we found; a nail had been driven through the conduit cutting the neutral and earthing it to the conduit, which being earthed completed the circuit, but the plumbers had removed the cistern to which it was earthed. The circuit was then completed through a gas pipe, which the conduit touched; the copper pipe pressed against the gas pipe and then touched the water main.

When the faulty neutral wire was renewed everything worked normally and everyone was happy.—*H.S.*

Bearing Extraction

APROPOS the recent correspondence in your columns concerning the extraction of bearings from rotor shafts. How do other maintenance electricians remove bearings which have been arranged by unthoughtful manufacturers to hide coyly within the protection of rotor cooling fins?

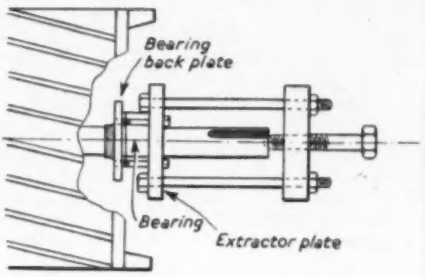
Vandal that I may appear, my own method is to utilise the bearing back plate in the following fashion: a circular piece is cut from steel plate of a suitable thickness, ¼ in. would do for up to a 2 h.p. motor, for instance, and the diameter would be about 6 in.

A hole is then drilled in the centre of this plate (hereinafter referred to as the extractor plate), a little larger than the shaft diameter. Three holes are then drilled, clearance size for the grease cap screws, and set out to mate with them.

The extractor plate should now be slipped on to the shaft and the g.c. screws screwed home as a test for fit. Everything being satisfactory the plate is removed and two holes ⅜ in. clearance are drilled, equidistant from the centre, and sufficiently far apart for ⅜ in. bolt heads to clear the bearing back plate, on a line scribed across the centre of the extractor plate face.

No! we are not engaged in making metal lace!

A piece of 2½ in. x ½ in. x 6 in. long flat iron is cut, and a line scribed along the centre of its widest face. Three holes are set out: one, in the centre of the scribed line, is drilled, tapped and



Assembly for extracting a bearing

supplied with a ⅜ in. stud filed to a point at the threaded end; this to mate with the pip in the shaft end.

The other two holes are spaced to suit the two ⅜ in. clearance holes in the extractor plate and drilled the same size. These to accommodate two spacing bolts.

This gear is then assembled as in the drawing.

Of some 18 or 20 bearings removed with this equipment I have had only one fatality, and that I found, on examination, to be the result of; (*a*) a cracked back plate, and (*b*) uneven tension on the plate screws. This last point is most important.

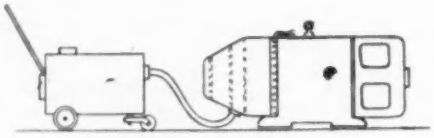
It is not a long job to make this gear and the time will, in any case, pay for itself with the second bearing of this type encountered. Acetylene burning equipment at hand is a great time saver. The length of shaft on different rotors raises no difficulty as one merely uses longer spacing bolts.—"*Hamfist.*"

Cleaning Motors

BLOWING out a motor without some means of collecting the dust has always seemed a refined form of cruelty to the maintenance electrician, to say nothing of depositing dust all over the surrounding area.

The availability of an industrial type vacuum cleaner suggested a means of collecting the dust, and a hood as per sketch was evolved from heavy canvas. A connecting point for the flexible pipe from the cleaner was formed by threading a suitably sized piece of brass tubing, fitting two nuts, two washers, and thus clamping the tube in position through a hole in the side of the hood. It is a good idea to reinforce the outlet hole by sticking, or stitching, a canvas washer over the aperture.

Three wire hoops covered with canvas, and graded in size are spaced at intervals in the hood. Stitching with a few threads of light twine serves to locate the hoops. The open end of the hood is turned back for about two inches and stitched down to form a tunnel through which runs a heavy draw-string. The ends of the draw-string are, of course, led out through a small hole in the canvas. Thus a reasonably airtight seal is achieved when the hood is secured in position over the motor end. Dimensions, and final arrangements will be determined by the general run of motors handled.



Set-up for dust removal

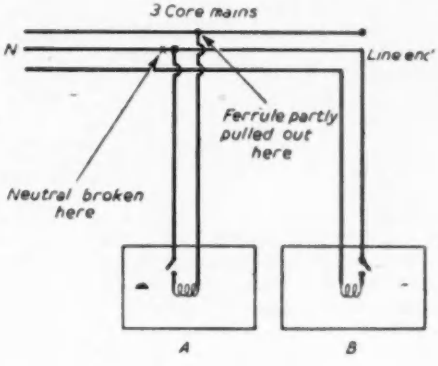
Once the hood and cleaner are in position, the dust can be dislodged by means of blower and brushes, or brushes only, working, of course, from the open end of the motor. The hood is then removed and refitted to the other end of the motor.

If the motor is fitted with oil wells, these should be drained before cleaning is commenced.—*F. R. S.*

Neutral Pranks

A CONSUMER reported from House A, he had trouble with the lighting. The maintenance electrician inspected and tested the installation and had a suspicion of the cause and went to the next House B to see if they had any complaints and was informed of similar behaviour by the lighting, and this is what was happening.

When A switched on a small lamp (25 W), he got a rather bright light, but when he switched on another lamp of higher wattage, he got only a dim light, and on switching another, got no light at all. This supposed "phenomena" was also occurring at B. When A or B had all their switches off the other had no light. The Mains Dept. were informed and they "got a hole out" by A (the engineer was aware that B was the last service off that main). He had a good idea as to what the trouble would be and sure enough there was a break in the neutral,



Details of the main faults

before the joint for A. By this break you will see that both houses were in series across the 2-phase wires (3 core mains), but only when each had a switch closed. If A had a 100 W and B a 25 W lamp switched on, then only B had a light. You may ask, if B had a 25 W and A a 100 W across a 400 V supply then why didn't the lamp blow. (The answer to that is to come.)

The neutral break was made off and supply restored. B was in order but A had only a dim light still. The joint was opened again and the reason became obvious; the ferrule on the phase wire was partly pulled out and was creating a high resistance joint only.—*P. E. G.*

Accelerated Heating

WE have to thank several correspondents who have pointed out an error in the note which appeared under the above heading in our issue of April 27. The rate of heat production in a resistive circuit is, of course, proportional to E^2/R, and so in the case described, the heat production would be doubled and not quadrupled by the fault.

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

High Temperature Insulation

The Fibreglass Convention at Southport

WITH the two-fold objective of teaching users about their products and learning from their customers' experience, Fibreglass Ltd. held a two-day convention at Southport last week. Attended by more than 60 engineers, including representatives of the supply, manufacturing and repair industries, the conference, under the chairmanship of Mr. C. W. Marshall, B.SC., M.I.E.E. (Deputy Chief Engineer (Research), B.E.A.) provided an excellent opportunity for the free interchange of information and working experience.

Delegates at the Fibreglass Conference

Manufacturing Methods

First paper was by Mr. A. M. Robertson B.SC., A.M.I.E.E. (Electrical Sales Engineer, Fibreglass Ltd.) who gave a brief account of the manufacturing methods for the various types available, commencing by tracing the earliest use of spun glass for telegraph insulation, in 1880 and continuing through suitable compositions of glass to the actual manufacture of the fine fibres.

Three basic processes are in use, of which one, the continuous filament process, is of particular interest to the electrical industry. In this, glass (in the form of $\frac{3}{4}$ in. marbles to facilitate regular semi-automatic feeding and uniform composition) is melted in an electrically-heated platinum crucible which has either 102 or 204 nozzles, each 1/32 in. in diameter. Through these the molten glass flows, to be attenuated to about 0·00023 in. dia. continuous filaments which are drawn off and wound on to cops at 6,000-1,000 ft/min, each $\frac{3}{4}$ in. marble making between 90 and 100 miles of filament about 1/15 the diameter of a human hair.

The gathered filaments are later twisted into finished yarns, running 90,000 yd/lb from the 102-hole and 45,000 yd/lb from the 204-hole furnaces.

The yarn may then be used as wound, or may be twisted into cords, or woven into tapes or cloth by normal textile manufacturing methods.

"Watts in Glass"

"Watts in Glass,", a colour film by the Owens-Corning Fibreglass Corporation of Toledo, Ohio, was then shown to the conference, demonstrating a number of applications of fibreglass to electrical insulation, with particular emphasis on its performance in the presence of excessive heat, moisture, corrosive fumes and in other difficult situations, and the reduction in motor frame size which was possible by the use of glass in place of organic insulation.

Factory Service

Highlight of the day, from the standpoint of the maintenance engineer, was "Fibreglass Insulation in Factory Service," a paper presented by Mr. R. C. Barnes, electrical engineer to Pilkington Bros., the parent company, which described his own experience of the use of high temperature insulation in the exceedingly arduous conditions imposed by a glass works.

High ambient temperatures are found in melting departments where furnace tanks may hold up to 1,000 tons of glass at temperatures up to 1,500° C. Fans, pumps, cranes and forming machinery all present their own problems under these conditions, many machines operating in ambient temperatures up to 150° F, which demand Class B insulation. An interesting case recounted was that of a travelling crane which for many years "cooked" a motor every six weeks. Glass and mica insulation raised the life to two-three years; failures now being

usually confined to melting of solder on the commutator risers when either the crane jams or the motor is actually licked by flames from a faulty furnace.

Continuous running at full load for over 150 hr/week "roasts" even the best motor with organic insulation and glass insulation has been the means of saving an alarming amount of maintenance, glass and mica having now given performances under high temperature of up to eight years without showing signs of deterioration.

In other cases, where there has been insufficient room for a liberally-rated motor, glass has proved literally the only solution. In one plate-glass mill there is space for a 1 h.p. motor and a load of 2 h.p., and it was the practice to change motors *every three hours*. A glass insulated motor has now been in use for several years.

In these works all motors above 5 h.p. have class B insulation and since a large number of motors is in use, it has now been found possible to standardise on makes, types and sizes. Motors requiring attention are replaced by an entire spare motor, the old motor then being completely overhauled and put into stores as a spare. The use of Class B insulation throughout saves the duplication of spares and the necessity of winders continually changing their methods, since there are certain differences between handling cotton and glass covered materials.

Materials Used

Wire is covered with two layers of fibreglass applied in opposite directions, impregnated by the manufacturers, thickness corresponding to D.C.C. except for d.c. fields when the equivalent of S.C.C. is used. For slot insulation, mica slips between fibreglass cloth is used. Coil ends are taped with either varnished or unvarnished tapes, according to the space available, since varnished tapes are easier to handle, but bulk more. Risers between commutator and coils are covered with unimpregnated glass sleeves and bound with glass cord.

Thorough impregnation of the completed winding is considered essential to resist the effects of abrasion, Silicone varnish was considered, in order to get full value out of the high-temperature properties of fibreglass, but supplies at the time were uncertain and high in price; furthermore, neither bearings nor clearances on the machines were suitable for the highest temperatures. The varnish finally decided upon is a good quality synthetic which is stable at up to 300° F. Vacuum drying is followed by conventional pressure impregnation at 25 lb/sq in., followed by draining and baking for six to eight hours at 150-170° F to drive off solvent and a further six to eight hours at 235° F to cure the varnish.

It was emphasised that no trouble was experienced with skin reaction due to handling glass-covered materials, and although barrier creams were provided, the winders just did not bother to use them.

Factory Production

Following the papers, a visit was paid to the Ravenhead works of Fibreglass Ltd. Continuous filament material is manufactured only on an experimental basis, the main production being at Glasgow, but several units were seen in operation. The production of staple fibres, wherein the filament is shattered by steam jets and the superfine staple, where the filaments are first attenuated and then shattered, were observed. Spinning processes were observed in operation on continuous filament and staple fibre yarns, and manufacture of glass "bat" or mats of staple fibre of varying thickness was in full production, this being also made up in the form of paper and canvas covered mattresses for general lagging purposes, and starch bonded rolled tubes for pipe lagging.

The afternoon also included a visit to the St. Helens works of Pilkington Bros. Ltd., the parent company, to observe the manufacture of toughened glass insulators.

Alkali-Free Glass

The importance of the correct chemical composition of the glass was stressed in a second paper by Mr. A. M. Robertson, who pointed out that a pound of textile filament had 7,000 times the surface area of a pound of solid glass, so that the effect of alkali—negligible in solid glass—became of considerable importance when considering fibres.

Since alkali leaches to the surface, an ionisable salt is presented to the atmosphere. Under conditions of high humidity, the insulation resistance is very seriously affected, tests showing that after 72 hours at 90% R.H. and 100° F, the insulation resistance was only about 1/40 that of alkali-free glass.

Lowered weathering resistance, increased power factor, corrosion of conductors, reaction with impregnating varnishes and reduced mechanical strength were other concomitants of alkali-bearing glass, the latter property being shown very clearly by comparative temperature cycle tests, when alkali-free glass retained 85% of its mechanical strength after five cycles, while alkali-bearing glass became too brittle to unwind from its spool after two cycles.

Resin-Bonded Laminates

Commencing by fixing about 110° C as the working limit for boards made from organic fibres, Mr. J. K. Hyde, of Ashdown's Ltd., an associated company, described the properties of laminates made from fibreglass cloth which, in this country, is practically confined to that woven from continuous-filament yarn.

Cloth of 3, 5 and 7 mil thickness is used, and phenolic, melamine or silicone resins are used for bonding purposes. Methods of cleaning the cloth prior to impregnation and pressing were discussed, and the remarkably stable characteristics of the silicone-bonded boards as regards breakdown strength, insulation resistance and power factor, under varying conditions of temperature and moisture absorption, were shown in tabular form.

Uses and Future

High spot of the conference was a paper, "Insulation of Electrical Plant with Fibreglass," by Mr. R. H. Robinson, B.Eng., A.M.I.E.E., (Insulation Engineer, General Electric Co., Ltd.), who dealt with the subject from the standpoint of an independent observer who had had a wide experience of the application of the material in all forms.

It was a complete mistake to regard the problem merely as one of replacing conventional organic materials with glass, and proceeding as before. A different technique had to be learned. In itself, fibreglass was no better than any other material—it was as full of holes and air spaces. Insulation depended on the varnish, in exactly the same way as it did with cotton or silk.

Regarding varnish, he pointed out that the old oleo-resin varnishes, could be used quite well, but since they did not withstand high temperatures they were not often used. Oil-modified synthetic resin varnishes were quite suitable for temperatures up to 150° C.

Finally, there were the silicones, which would work for long periods at more than 200° C. A motor with which he had been intimately connected, had operated at 250° C for 5,000 hours, after which it failed due to oxidation of the copper.

The H'gh Temperature Myth

This life, Mr. Robinson pointed out, was equivalent to only 2½ years at 40 hours/week. Calculations based on work by G. L. Moses (Westinghouse Electric Corpn.) showed that for a life of 20 years the temperature should not have exceeded 214° C. It was quite time we revised our ideas on high temperature machines and there was a welcome trend in this direction.

Bearings gave trouble above 100° C, commutators softened, and, above 220° C commenced to oxidise. There was a case for the high temperature machine for special applications, notably for very high ambient temperatures, artificial limits on bulk or weight, or where minimum inertia was essential. For the general run of applications, 150° C was a reasonable upper limit, but to pursue the high-temperature machine for its own sake was pointless.

This did not by any means infer that he considered the field of fibreglass restricted—on the contrary, he was completely in favour of replacing all organic insulation. The ability to withstand high temperatures was a very valuable quality, it was the deliberate attempt to design for high temperature running which he considered to be a mistake.

The field for glass was well assured, but the quality needed improvement—particularly on the score of thinness. What was needed was cloth of the thinness—and cheapness—of "3 momme" silk.

Where cloth was used for backing mica, there was a need for a more open weave, and he appealed to the weaving industry to attempt to develop such materials. To a layman, a difference of half a mil in the thickness of cloth might sound negligible but when one considered that wrapping was at least half-lapped, every half mil meant a total of 0·002 in. on the total width of a wrapped bar which, in the case of thin sections, might amount to 5% less copper for a given slot width.

Techniques and Costs

Many details in winding technique required radical changes. It was not possible to use friction pads on winding machines to provide tension. Bias cut tape provided a particular problem on account of its low tensile strength—straight cut was satisfactory from this aspect but did not lie snugly in corners.

On the question of costs, he would not say that the prices of fibreglass materials were too high in the present state of the art, but he did feel that they were high compared with other materials. If the electrical industry could obtain glass materials as cheaply as their silk or cotton equivalents, they would quickly learn the new techniques required. Vegetable fibres ought to be eliminated from electrical machines and apparatus. It would be very satisfying indeed if one could feel that all machines turned out in the future were almost indestructible because of their glass insulation. As a result of the discussions and interchange of experiences at this conference he was looking forward to that time.

Gas Turbines challenge Steam

Dr. Roxbee Cox discusses Development Progress

POSSIBILITIES of burning residual oil and coal in industrial gas turbines are reviewed by Dr. H. ROXBEE COX (Chief Scientist, Ministry of Fuel and Power) in this year's May lecture of the Institute of Metals, which he delivered last week. He begins with an account of work by the British and Swiss up to the end of 1945, at which time it was decided that we should try to overtake the Swiss in this developing branch of engineering, and follows this up with a list of the sets now working in Great Britain and Europe.

So far as running on residual oil is concerned, there is no difficulty in burning the heaviest oil, and the removal of solid particles from the products of combustion can be achieved. The unsolved problem is the removal of the corrosive results of combustion, with vanadium pentoxide as especially troublesome.

Coal

With direct internal combustion of coal the major problem is how to deal with the ash; this is a mechanical difficulty, there being no chemical problem comparable with that caused by vanadium pentoxide. Possible solutions being investigated include a vortex chamber, in which the particles are held in suspension while being burnt, and a cyclone combustion chamber, when the particles burn against a wall, leaving most of the ash in the form of a liquid slag. For two-stage internal combustion a cyclone type of furnace operating with low grade pulverised fuel at an ash-slagging temperature is envisaged. This will require blast preheating to about 1,000° C, and a ceramic heat interchanger has been designed for this purpose.

External combustion is possible if the coal is burnt to heat an air "boiler," and the maximum possible use of the heat in the air is made by sending it into the furnace after expansion through the turbine. The cycle cannot be very efficient (15-20%), and is worth considering for a coal with high ash content.

A closed cycle external combustion engine has similar advantages with a higher efficiency, but if it works with a pressurised air heater, as has usually been considered, then the ash-containing gas must still be passed through the auxiliary turbine driving the air compressor. John Brown's have improved matters by designing a relatively small atmospheric heater, but the possibility of trouble due to the action of ash on the boiler tubing remains.

Peat and Gas

Peat, like coal, can be used in both open and closed cycle engines, and in both there is the possibility of using it in a wet state—as cut, it is about 90% water, and is usually dried down to 30% before burning. The heat generated in the gas turbine cycle may be used for drying out the peat, and it is hoped that eventually steam given off in the drying process may be used to augment the power of the turbine. For a given size of plant it appears possible to quadruple the power by this means. Peat ash seems likely to be somewhat less abrasive than coal ash, and a lower standard of cleaning may be permissible.

In this country there are few appreciable sources of natural gas for powering turbines, but gas from the underground gasification of coal is likely to be suitable if present experiments meet with success. A second source is the methane contained in the upcast air from coal mines. The fact that the concentration rarely exeeds 1% is not basically a disadvantage, and it is hoped that auxiliary solid fuel such as colliery fines may be used to bring very weak concentrations up to this strength. Preheat to about 980° C will be necessary to secure combustion.

Summing up the prospects of the gas turbine in the power station, Dr. Roxbee Cox emphasised that it is now challenging the steam turbine as a base load plant. Most engineers closely associated with gas turbine development think that its efficiency can be raised to 40%, but visualise difficulty in building units as large as, say, 100 MW. If large units are demanded, they are likely to work on a closed cycle, because (power for power) their rotors are likely to be smaller than for an open cycle, and rotor size is likely to be a limiting factor.

Amongst the advantages of the gas turbine is the absence of any component comparable in bulk with the steam turbine boiler, and the fact that it can supply energy to a district heating scheme with no fall in its efficiency for power generation.

Notes on Wiring
by MEGOHM

What is Adequate Wiring?

Further Notes on Recommended U.S.A. Standards

CONTINUING my remarks on this page a fortnight ago on the above subject, further investigation shows that the recommended requirements are well in advance of those usually thought sufficient in this country.

In considering some of the following figures we must bear in mind, however, that in many parts of the States 110-120 V circuits are common and for that reason the capacity of cables and fuse gear, etc., must of necessity be greater than would be necessary over here.

Service cable and main control gear. It is recommended that all services shall be 3-wire, 115/230 V, with 60 amp conductors for a floor area of up to 1,000 sq ft; 65 amp for up to 1,500; 85 for up to 3,000; and 100 for up to 4,000 sq ft, which gives a 60 amp switch for the smallest installation and one of 100 amp capacity for the remaining three.

Allowing for diversity, it is contended that the above values are satisfactory for normal requirements, and also contain a reasonable margin to cover subsequent additional equipment which may be added later on.

Circuiting

So far as I can gather, the regulations for main- and sub-circuits vary from State to State, but the handbook recommends that circuit protection should be installed at various points in a house and not be confined to one single location; appropriate sized "feeders" radiating out to these points from the main intake position.

"Branch" circuits, i.e. sub-circuits, are classified under the three headings of General Purpose (15 amp), Appliance (20 amp) and Individual Equipment, these latter being rated according to the particular load to be connected up.

General purpose circuits cover all lighting points and all "convenience" outlets, except the outlets in the dining-room, breakfast room, kitchen, pantry and laundry. One circuit per 500 sq ft of floor area is specified with the load balanced equally over the circuits installed.

Appliance Circuits. Two of these 20 amp circuits are specified for the outlets excluded above in premises with a floor area of up to 1,500 sq ft, the circuits to be so arranged that both feed points in the kitchen and in the laundry. For floor areas above 1,500 sq ft, three circuits are required: one for the kitchen, pantry, breakfast room and dining-room; one for the laundry; and one for points in both the kitchen and in the laundry. This arrangement of wiring, it will be seen, gives a certain amount of security of supply in the event of one circuit becoming faulty.

Individual Equipment Circuits. These are intended for use with cookers, water heaters, dishwashers, heating appliances, etc., and are rated according to the actual loading required, though it is suggested that two appliances not likely to be used simultaneously may be looped on one of these circuits, as for example, a summer cooling fan and a bathroom heater. Attention is also drawn to the fact that there is a growing tendency to arrange fixed appliances for 208-220-240 V pressure, and this higher voltage should be preferred when possible.

Wiring. Single stand conductors seem to be preferred and the corresponding current rating is higher than that permitted under our regulations for v.r.i. Thus a 14 gauge (B. and S.) wire almost equal to 16 s.w.g. or ·003 sq in. (3/·036 in.) is rated at 15 amp, compared to our 10, and a 12 gauge (B. and S.), 1/ 083 in. approx. or ·005 sq in. (7/·029+) is rated at 20 amp.

Figures and Costs

Finally, it is stated that the average "adequately wired" house, with six rooms and costing $17,000, has 40 convenience outlets, 31 switches and lighting points, contains 13 branch circuits (excluding the cooker circuit) and has a 100 amp service capacity.

As might be expected, the increased facilities for using electricity in the home have brought about a greater consumption, and even now the peak has not been reached. Some 25 years ago the average was less than 400 units per annum, by 1947 this figure had increased to over 1,400 and today figures in the order of 4,000 to 5,000 are not uncommon.

It, therefore, remains for us to ensure that the installations we design or install are sufficient in extent and suitable for their purpose.

overseas news

Manufacture in Italy

Arrangements have now been completed under which the Italian electrical concern, Ercole Marelli, will construct turbo-alternators of up to 60,000 kW under licence from the Westinghouse Electric Corporation.

Approval of Goods

After April 1, 1951, it will be illegal to sell or hire portable electric cookers and grillers in the State of Queensland, Australia, unless they have first been approved by the State Electricity Commission. An Order in Council, making these regulations, was gazetted recently. The State Electricity Commissioner, Mr. S. F. Cochran, said that this equipment as sold in its present form was not dangerous, although certain modifications were necessary on some makes to produce a standard type of equipment which would be the safest for public use. The Minister for Mines, Mr. Moore, said it was the policy of the government progressively to prescribe electrical equipment so that ultimately it all would be subject to test by the Commission before being sold. Electrical manufacturers, he said, were co-operating in the scheme.

Inaugural Convention

The inaugural Australian Electrical and Telecommunication Industry Convention was held at Albury, N.S.W., earlier this month, and attended by some 82 delegates, Mr. R. J. W. Kennell, of Electricity Meter and Allied Industries Ltd., presiding. At the gala dinner, Mr. V. J. Brain, representing the Electric Supply Association of Australia, said a total of £400 million would be spent on expanding electricity supplies during the next ten years, of which about £260 million would go to Australian firms. The president elect is Mr. J. Wilson, M.I.E.E., A.M.I.E.(AUST.), managing director of Wilson Electric Transformer Co. (Pty.) Ltd., and vice-president of the Federal Council of Electric, Radio and Telephone Manufacturers of Australia.

A Power Shortage?

Unless immediate and courageous steps were taken in regard to development of power sites, Winnipeg and Manitoba might face a critical power shortage, declared Mr. W. H. Carter, president of the Winnipeg Electric Co. at that concern's annual meeting. Plans for water power development should be at least five years in advance of actual needs. Referring to plan "C" of the Hogg report, he said there had been considerable discussion in regard to the Manitoba Government and the taking over of generating plants in the province but up to the present time the company had not been approached in the matter. He considered there was an imperative need for an immediate clarification of the situation.

Change-over in Ontario

In two Southern Ontario districts, 6,641 consumers supplied by the Hydro-Electric Power Commission of Ontario will have their appliances changed over from 25 to 60 c/s during this month, the chairman of the Commission stated recently.

Spraying of Foliage

To retard the growth of foliage and tall timber alongside its transmission lines, the Research Division of the Hydro-Electric Power Commission of Ontario has evolved herbicides which are sprayed over brushwood, etc. Similar tests were made in three sections of the Province last year.

Jo'burg Proposals

At the meeting of the Johannesburg Tramway and Lighting Committee recently, the Electricity Department submitted estimates for the year 1950-51, in which reference was made to a proposal to borrow £571,500 for a further major distribution scheme. It is estimated that only £37,900 of this amount will be spent during the next financial year.

Pakistan's Scheme

In the course of his address to the Far East American Council of Commerce and Industry and the National Foreign Trade Council in New York last week, Mr. Liquat Ali Khan, Prime Minister of Pakistan, said that within a few months of independence the country's requirements for electric power were estimated and a target of 500 MW was laid down to be reached in five years. Of this amount 100 MW would be in East Pakistan, 200 MW in the Punjab, 100 MW in North-West Frontier Province, 20 MW in Bahawlapur and 80 MW in Sind and Baluchistan. The government had appointed Messrs. Merz, Rendel and Vatten (Pakistan) to assist the Central Engineering Authority. As a result, not only had the deterioration of existing power stations been arrested, but there had been a positive increase of output. Consulting engineers had now been asked to prepare an all-Pakistan plan for electrical development and to carry out an intensive load survey for that purpose. It was proposed to have two grids, one for the Eastern and the other for Western Pakistan for the transmission of power. The overall plan would take another six months or

so but, in the meantime, measures were being taken to relieve the power shortage by improving all existing and constructing new hydro-electric and thermal stations. Stating that cheap electrical power was the basic need of Pakistan, the Prime Minister said it was expected to double the hydro-electric power by the end of this year and to be quadrupled by the beginning of 1952. Another hydro-electric project was expected to be completed by the end of 1952 and two other projects which were still in the investigation stage by 1956/57. To supplement these supplies, it was also proposed to construct central generating stations at appropriate load centres in East and West Pakistan, and surveying was going on for the location of these stations.

Christchurch Development

Despite slight restrictions, units sold by the Christchurch City Council Electricity Department, N.Z, increased by 12·8% for the year ended March 31, 1949, according to the annual report just received. As a result, revenue recovered to a more normal level, even though an increase of 10% in a new contract for the bulk supply operated for three-quarters of the year. To ease matters, the temporary discount was dropped, so the undertaking finished the year with a surplus of £16,900 plus £3,206 from the trading accounts. Of the 200·8 million units sold during the period, 139·9 million were for domestic use. At the end of the year, there were 24,244 domestic cookers and 496 commercial ranges connected to the Department's system, of which 1,799 were installed during 1948-49. There were also 22,515 domestic water heaters and 479 commercial and industrial water heaters connected to the mains. And yet domestic consumers number 40,897 and commercial and industrial, 6,281.

Price Controls Lifted

Certain types of electrical goods have been freed from price control in New Zealand under a notice just published in the Gazette. The items listed are coffee percolators, flashlight torches, immersion heaters, jugs and elements, and kettles and elements.

Power of the Future?

Looking to the future, Mr. F. R. Benedict, engineering manager to Westinghouse Electric and Manufacturing Co., believes that a harnessed sun, not atomic energy, may well become the principal source of power. The heat from the depths of the earth is another tremendous energy potential, if we could learn how to get hold of it, he added. Development of solar energy as a continuous source of power would come anyway, he predicted, urging that a solid groundwork be laid for the coming generations. By improving utilising devices and importing oil, it may be possible to struggle along for about 200 years, perhaps a maximum of 600 years, on unrenewable fuels such as coal, oil and natural gas. He considered the limited amounts of the two fissionable elements, uranium and thorium, would control the broad scale applications of atomic power, and it seemed unlikely that atomic power would ever supply any large proportion of the total energy requirements. One practical way of capturing the energy now lost when the sun's rays are reflected off the earth's surface was by optical means, "the old magnifying glass principle." In this way sunlight can be concentrated about 50,000 times to produce very high-temperature furnaces, he concluded.

Grand Coulee almost Completed

Grand Coulee Dam, on the Columbia River, State of Washington, was dedicated by President Truman on Thursday last, on the virtual completion of the project. Claimed to be the largest concrete structure in the world, the dam is part of the Columbia Basin project that serves about 30 rural electric co-operative systems. The dam is 4,173 ft long, 500 ft thick at the base and 550 ft high above the lowest bed rock. Each of the two power stations at either end of the dam will house nine 108,000 kW 13·8 kV generating sets, of which thirteen are already installed, giving a total installed capacity of 1,944,000 kW. In addition the West plant has three 10,000 kW house sets. The first of the main sets was put into operation on June 1, 1942. At the dedication ceremony last week, President Truman said he was determined to develop low-cost public power on all the great American rivers.

Grand Coulee, on the Columbia River

PERSONALITIES

IN THE INDUSTRY

To succeed **Mr. F. J. Stevenson,** who retired a short time ago, Crompton Parkinson Ltd. have appointed **Mr. D. G. Maynard,** of the firm's Manchester branch, as textile applications specialist. Mr. Maynard joined Crompton Parkinson in Glasgow as plant sales engineer on being demobilised from the R.A.F. in 1946. Transferred to the Manchester branch in October, 1947, he was subsequently appointed assistant to Mr. F. J. Stevenson.

Previously with the Sloan Electrical Co. for a number of years, **Mr. H. T. J. Edwards** has now joined the British Electrical and Manufacturing Co., Ltd., as sales manager attached to their London office at Maidstone House, Berners Street, W.1.

At the age of 76, **Mr. Parry Jones** has retired from the Merseyside and North Wales Electricity Board, for whom he was engineer at Dolgelley. He was formerly manager of the Dolgelley U.D.C. electricity undertaking, serving in that capacity for about fourteen years. He was, however, practically for the whole of his life actively engaged in many of the smaller developments in North Wales, particularly small hydro-electric works, although he has also been responsible for some small steam and oil engine stations. Guest of honour at a luncheon, he was the recipient of a presentation made to him on behalf of his colleagues by **Mr. R. N. Pegg,** sub-area manager.

We understand that **Mr. J. Johnson Smith,** M.I.E.E., has been appointed to the board of directors of the Electric Construction Co. Ltd.

Mr. J. J. Smith

Known amongst his friends as "J.J.," Mr. Smith joined the company in 1945 as London manager, in which post he will continue, being responsible for the firm's sales organisation in London and the South of England. Earlier, he had been with Johnson and Phillips Ltd. as London manager. He started his engineering career with York Corporation, later going to Sunderland Corporation. He then joined F. and A. Parkinson Ltd. as manager of that firm's Glasgow office, and subsequently became branch manager of the Manchester office of Crompton Parkinson Ltd., transferring to their London office in 1930. Three years later he joined Johnson and Phillips. He was chairman of the A.S.E.E. during 1939/40.

Three members of the Eire Electricity Supply Board have just retired on completion of their terms of office. They are: **Dr. Laurence J. Kettle,** D.Sc., M.I.E.E., **Mr. L. Forde** and **Mr. H. Golden.** One of the most distinguished electrical engineers in Eire, Dr. Kettle is also very well known in this country. He studied at Faraday House, gained practical training and early experience in turn with R. Stephenson and Co., Newcastle-on-Tyne, Oerlikon of Switzerland and the General Electric Co. Returning to Dublin in 1912 as deputy city electrical engineer, he became city electrical engineer, and manager in 1918, which position he held until the undertaking was taken over by the Supply Board in 1929. His services were retained by the Board in an advisory capacity until 1934, when he was appointed a member of the Board. As chief of the Dublin undertaking he was responsible for the design and construction of a great deal of extension and development work. He acted on, and was largely responsible for the formation of, the Water Power Resources of Ireland sub-committee, which prepared the way for the hydro-electric development of the Shannon and, later, the Liffey. Dr. Kettle remains chairman of the Industrial Research Committee, and a director of the Industrial Credit Co.—both semi-State concerns.

Dr. Laurence J. Kettle

Mr. R. H. Bartley, M.I.Mech.E., M.I.E.E., M.N.Z.I.E., general manager, and **Mr. E. Hutchinson,** A.M.I.E.E., M.N.Z.I.E.E., supply engineer, to Auckland Electric Power Board, are due to retire towards the end of this year.

Mr. V. L. Breeze has been co-opted to the board of Allen West and Co. in place of **Mr. F. E. Colchester,** who has retired, and **Mr. A. E. Owen** is also appointed to the board in place of **Mr. H. Tonkinson,** resigned.

Mr. Harold Hobson, B.Sc.(Eng.), M.Inst.C.E., M.I.E.E., has resigned from the board of Southern Areas Electric Corpn. Ltd., and **Mr. W. C. Gould** has been appointed to fill the vacancy.

Ekco-Ensign Electric Ltd. announce the appointment of **Mr. C. D. T. Bell** as sales manager in Birmingham and the Midland counties. He was formerly Midland area manager for Smart and Brown (Engineers) Ltd.

Formerly with the British Thomson-Houston Co. Ltd. at Birmingham, **Mr. R. K. Cox** has been appointed manager of the Sheffield district office of the Edison Swan Electric Co. Ltd.

The B.B.C. has appointed **Mr. M. H. Hall** as engineer-in-charge of the new Television Studio Centre at Lime Grove, Shepherds Bush. He has been with the B.B.C. since 1927. During the war he was assistant engineer-in-charge successively of the Start Point and Woofferton transmitting stations. In 1946 he returned to Alexandra Palace, becoming assistant engineer-in-charge there at the beginning of this year.

A presentation luncheon was recently given by the British Association for Commercial and Industrial Education in honour of **Dr. P. Dunsheath,** C.B.E., M.A., D.SC., M.INST.C.E., M.I.E.E., who retired from the chairmanship of the B.A.C.I.E. Council last autumn.

Mr. E. N. B. Hammond has been appointed engineer-in-charge of the B.B.C's Norwich transmitting station, which was opened last year.

We learn that **Mr. A. J. C. DeRenzi,** A.M.I.E.E., was elected to the Newcastle-under-Lyme Town Council last week.

Mr. H. Chisholm, managing director of A. C. Cossor Ltd., has been nominated as chairman of the Corby new town development corporation.

Appointed Middle East representative for B. French Ltd., to be in charge of projects in Saudi Arabia, **Mr. William Walker** recently left this country. Our photograph, showing Mr. French wishing him *bon voyage*, was taken at a dinner following a conference of directors and branch managers of the firm. Mr. Walker is to take charge of the contract for the electrical work on the new Docks and Customs offices at Jeddah, Saudi Arabia. He was recently second-in-command on the "electrification" work of the Brabazon hangar at Filton carried out by the firm.

Mr. W. Walker, on the left, receiving the good wishes of Mr. B. French

The new publicity manager of Ekco-Ensign Electric Ltd. is **Mr. K. Howard,** pictured here, who, since 1945, has been responsible for dealer liaison in the main Publicity Department of E. K. Cole, Ltd., which until recently handled publicity for Ekco-Ensign in addition to the whole range of Ekco products. Ekco-Ensign are now forming a separate publicity unit under the direct control of **Mr. J. F. Young,** managing director of Ekco-Ensign Electric Ltd.

Mr. K. Howard

Indicative of the attention now being given to all aspects of the problem of the packing and safe transit of every type of electrical product for the home and export markets is the appointment of **Mr. E. G. O. Ridgwell** to the new post of packaging controller to the General Electric Co. Ltd. Recently elected vice-chairman of the Southern area of the Institute of Packaging, Mr. Ridgwell has been with G.E.C. since 1946, and early in 1948 was appointed to deal with the packaging problems of the company. In December last, he represented B.E.A.M.A. on the specialist packaging team sent to the U.S.A. under the sponsorship of the Anglo-American Council of Productivity.

Mr. E. G. O. Ridgwell

Mr. M. E. Harper, A.M.I.E.E., is second assistant engineer, in charge of the metering section in the technical department of the London Division, B.E.A., and not senior assistant as stated last week.

OBITUARY

The death has occurred at the age of 75 of **Mr. H. B. Poynder,** M.I.E.E., formerly with Merz and McLellan at Newcastle-upon-Tyne. He also served for 18 years as honorary secretary of the North Eastern Centre of the I.E.E., retiring from that post at the end of 1938.

We note the death, on May 11, of **Vice-Admiral C. S. Holland,** C.B., who had been head of the Admiralty Signal Department, and was a director of A. C. Cossor Ltd.

Mr. K. E. Stockton, president and director of American Cable and Radio Corporation, died on May 12, aged 57.

WILLS.—Mr. C. C. Atchison, M.I.Mech.E., M.I.E.E., J.P., left £25,016 (£24,475 net value).

Mr. A. H. Meysey-Thompson, J.P., M.INST.C.E., a former vice-chairman of the Yorkshire Electric Power Co., left £26,317 (£26,215 net value).

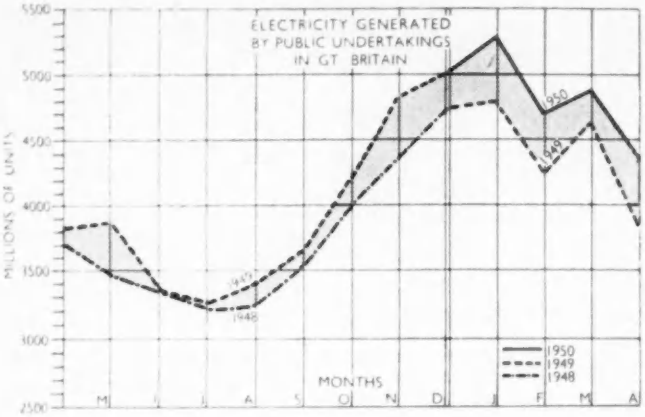
D

UNITS GENERATED

During month of April, 1950, a total of 4,310 million units was generated in stations under the control of the B.E.A., the North of Scotland H.E. Board, and the Lochaber Power Company. The corresponding figure last year was 3,775 million, and thus the increase is 14·2%.

Of the total, 4,175 million units was generated in steam stations, and 116 million in hydro-electric.

Energy sent out during the month was 4,069 million units, 94·4% of that generated. This gives the total for 1950 so far as 19,180 million units, an increase of 10% on the corresponding period in 1949.



POWER SUPPLY IN APRIL

ONCE more a lean month follows one in which much plant was installed. No sets are noted as coming into operation during the month, but a second 180 klb/hr boiler (Mitchell Engineering) has been completed in the extensions to the Yorkshire Division's Ferrybridge station. The reduction in installed capacity which is indicated in the diagram is due to the annual reassessment of the maximum continuous rating of much of the plant.

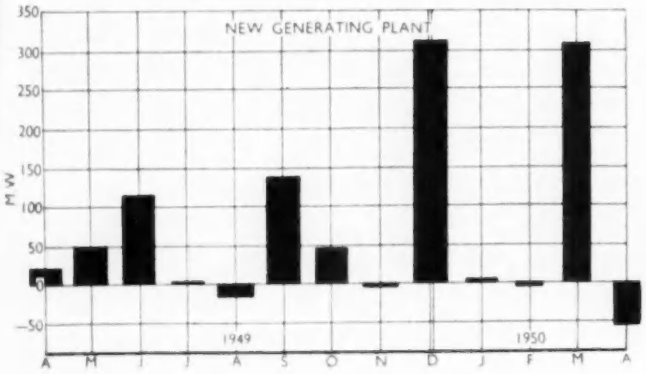
Generation

For the B.E.A. the fall from the peak figure of 5,158 million units generated in January continues. Of April's total of 4,205 million units, steam stations were responsible for 4,153 million, while 37 million units came from hydro-electric stations. For the North of Scotland the amount generated by water increased to 79 million units, while 22 million units came from steam stations, the lowest since last June.

Of the overall total, 9 million units came from oil engines, 0·2 million from refuse destructors and 9·7 million from waste heat plants. Altogether, some 2,494,000 tons of coal and 5,300 tons of oil were used during the month.

Maximum Demand

Figures of maximum demand are now available for the first quarter of 1950, and show that the maximum simultaneous loads in the country in January, February and March, respectively, were 11,305, 11,222 and 10,745 MW respectively. Corresponding figures for last year are 10,456, 10,507 and 10,154 MW.



GENERATING PLANT

At the end of April the installed generating capacity of the B.E.A. was 13,789 MW, a decrease of 53 MW compared with the end of March. The North of Scotland total has remained steady at 378 MW, and thus the overall total has decreased to 14,167 MW. The overall increase in the last twelve months now stands at 390 MW, or 6·7%.

The installed capacity, used for the purpose of this diagram should be distinguished from the output capacity. The installed capacity is the total m.c.r. of all the generating sets which are connected on both steam and electrical sides and are suitable for use.

The BUYER'S *Column*

Plessey Introduce T.V. Components

A NEW and comprehensive range of television components, embracing deflector coil assemblies, scan output transformers and focusing units as well as control resistances, loudspeakers, electrolytic capacitors, R.R., I.F. and filter coils and chokes and transformers, has been introduced by THE PLESSEY CO., Ilford.

Each component has been designed to allow maximum advantage to be taken of contemporary television receiver circuit simplification. In some instances standard radio components have been adapted by special reinforcement of characteristic or modification of construction and basic components are individually designed to be as flexible as possible to suit the many alternative combinations of circuit, valve range and cathode ray tube type as well as the possible various electrical operating conditions.

"The Derby"—a Sure Winner

MANY years of research have culminated in the introduction by JAMES STOTT AND CO. (ENGINEERS) LTD., of Vernon Works, Oldham, of their "Derby" instantaneous water heater.

It is designed as a streamlined economy unit especially suited to the needs of small refreshment rooms, canteens, all-night cafes, in fact wherever boiling water is required instantly at widely varying times and long intervals.

The "Derby" has many special features which add to its selling value. Principal amongst these is its low loading and high capacity—total loading is 3½ kW, the actual heating up takes place most frequently in off peak periods and thereon gives 24 hours service on a reserve heating of 250 W and it allows 4½ gallons of hot water to be drawn straight off at any time.

An example of the economy in the operation of the unit is that unless the boiler can be turned off for at least 15 hours, it has been proved cheaper to leave it perpetually switched "on."

Measuring Small Deflections

BOARD of Trade authority has now been granted for the importation of a small stock of R.C.A. Type 5734 mechano-electronic transducers for use in approved institutions. This instrument is a triod type transducer in which the relative positions of the electrodes can be moved by means of an external shaft. It has the main properties of light weight, high sensitivity, low moment of inertia and a high natural resonance frequency. The actual weight of the transducer itself is only $\frac{1}{16}$ oz with a length of 1 9/32 in. and a diameter of $\frac{1}{16}$ in. Sensitivity is 40 V/degree, the moment of inertia 3·4 mg/cm² and free resonance 12 kc/s. Those interested should apply to R.C.A., PHOTOPHONE LTD., 36 Woodstock Grove, W.12.

Price Reductions

CURRENT announcement by GENERAL ELECTRIC CO. LTD., Magnet House, Kingsway, W.C.2, concerns the price of "Silverlac" conduit which has been reduced as from May 1 to 5% above black enamel prices, instead of 10% as before.

More Canteen Equipment by "Arora"

FURTHER development in the range of unit type canteen equipment made by THE ARORA COMPANY, Roseberry Street, Loughborough, is represented by the introduction of a 4-pot Bain Marie Hot Cupboard, which we illustrate.

Each pan has a capacity of 8 pints and heating is provided by "Arora" armoured type elements mounted under the pans and controlled by "Simmerstat". Similar elements heat the hot cupboard. Loading of the Bain Marie is 1·75 kW and for the hot cupboard 2 kW.

In a standard finish of sprayed aluminium enamel or finished in white enamel with aluminium hob and black plinth, the unit is constructed with welded steel frame and sheet steel panels on similar lines to the unit type fish fryer mentioned in this column in our issue of June 9, 1949. It can be built into a composite equipment for cafe use or can be fitted with castors. Price of the standard equipment is £51 9s. ex works.

The Arora "Bain Marie"

TRADE PUBLICATIONS

METALCLAD SWITCH AND FUSEGEAR. Barries Electrical Agencies, Ltd., King Street, Brighton 1, England, are agents for "Dexray" metalclad switch and fusegear. Leaflet No. 1450 lists the range available.

SWITCHES. From A. P. Lundberg & Sons, Ltd., of Credenda Works, Rood End Road, Oldbury, Birmingham, we have received their latest folder containing illustrated information on their fine range of switches.

STREET LIGHTING. Efficient and adequate street lighting helps to combat crime. In these days of "cosh" assaults this factor assumes even greater importance. The range of equipment supplied by Metropolitan-Vickers Electrical Co., Ltd., St. Paul's Churchyard, London E.C.4, is surveyed in the new catalogue issued by the firm.

FLASHERS. Details of the Denny "Scintillator," a high-speed vibrating light equipment, are set out in a leaflet issued by the maker, C. W. Denny, 8 Beaumont Court, Sutton Lane, Chiswick, London W.4.

RADIO MATERIALS AND CABLES. Two well-produced catalogues which should be in every radio engineer's workshop or office are now available from B.I. Callenders Cables Ltd., Norfolk Street, London W.C.2. Publication 258, illustrated in colour, lists and gives detailed specifications for the radio frequency cables produced by the company, whilst Publication 273 does the same for the many different items classified under the heading of radio materials.

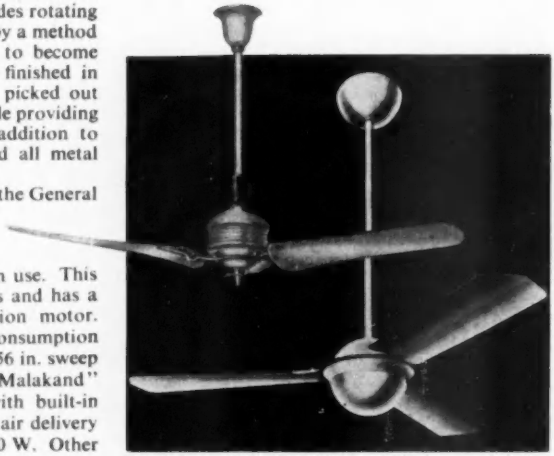
MEASURING INSTRUMENTS. Sifam precision-built instruments are described in a new folder issued by the Sifam Electrical Instrument Co. Ltd., Leigh Court, Higher Lincombe Road, Torquay, Devon. Particularly interesting is the range of 8 in. sub-standard portable instruments.

PUMP CONTROL. The "Noflote" pump control system, which embodies several new ideas obviating the use of float switches, is the subject of a brochure recently published by Evershed and Vignoles Ltd., Acton Lane Works, Chiswick, London W.4.

Ceiling Fans for World Markets

HIGH-EFFICIENCY performance and a long life are two features of the ceiling fans made by Crompton Parkinson Ltd.—incidentally, Crompton ceiling fans have been manufactured since 1898. Designed for continuous operation in tropical climates in arduous atmospheric conditions, the present range are all of the capacitor type, with the condenser permanently in circuit, and have three blades, models being available with 60 in., 56 in. and 48 in. sweeps. The 60 in. model has a consumption of 59 watts, delivers 13,800 cu ft of air per minute, the blades rotating at 196 r.p.m. The blades are secured by a method which makes it impossible for them to become detached accidentally. The fans are finished in satin white with revolving rotor rim picked out with a gold line. A regulator is available providing for 12 active running positions in addition to "off." The contacts are silvered and all metal parts are rust-proofed.

In the range of ceiling fans made by the General Electric Co., Ltd., the "Kingsway" is claimed to be the most widely used fan of its type in the world today, nearly a million being in use. This model is for a.c. single-phase supplies and has a totally enclosed shaded pole induction motor. Air delivery is 12,500 cu ft/min, consumption 125 watts, the three blades forming a 56 in. sweep rotating at 210 r.p.m. The firm's "Malakand" fan, uses a capacitor type motor with built-in condenser, the 60 in. sweep giving an air delivery of 12,000 cu ft/min; consumption is 60 W. Other models are available having 36 in. and 48 in. sweeps. The former gives an air displacement of 6,000 cu ft/min, and the latter 8,000 cu ft/min. For d.c. supplies the "Malaya" is available with three blades having a 56-in. sweep, the air displacement being 12,000 cu ft/min. For this, and the a.c. models, speed regulators are available. These details should be added to the information published in our April 20 issue. Incidentally, the model described on page 632 of that issue as a wall circulator, is in fact the 16in. table and bracket model, ref. no. V171, made by the G.E.C.



Top left, is G.E.C.'s "Kingsway" fan, and below, the Crompton model

Control in Nationalised Industries

Workers' Participation urged by E.T.U. President

ALTHOUGH the electricity supply industry was now a unified integrated whole under centralised management, there being no division between production and distribution of power, nationalisation had not changed the status or relationship of the employees in the industry. The relationship was still the same—that of employee and employer, declared Mr. Frank Foulkes, general president of the Electrical Trades Union, at the fourth annual delegate conference of the union, which opened at Ramsgate on Monday. He maintained that there was no provision for direct workers' participation in the control and management of the industry; they were admitted in an advisory capacity only.

Wage Claims

Wage claims had still to be formulated and stated through the machinery which was established following the 1914-18 war. The argument against the claims were similar to those used before nationalisation and in private industries not nationalised.

Turning to financial matters, he averred that interest on borrowed capital and interest on compensation stock to previous owners were still the first charge on the industry. Interest payments on the first year's trading amounted to £15·85 millions; salaries and wages only totalling £6·05 million. Investment, therefore, in the nationalised industry gave a better financial return than effort.

Comparative wage and salary scales within the industry proved the perpetuation of the division between technical and clerical grades and the operative and manual workers. The technical and clerical grades not only received higher salaries scale, but their leisure was greater, their holidays were longer, their sickness pay was better and they were provided with the wherewithal to retire in decency and comfort; whereas the manual worker was denied the fundamental right because of the amount that would be chargeable against the industry by the introduction of a superannuation scheme covering all workers.

Stock Interest

If interest on compensation stock was cut by half, if capital development was financed in a socialist way, there would be sufficient for all workers to enjoy equal amenities, he considered.

If the British Electricity Authority were to complete their programme and obtain the developments necessary to provide the electrical needs of the community, it was vitally important that Section 2 of the 1947 Act, which allows the Authority to manufacture electrical plant and fittings, should be implemented immediately. Orders for low pressure water valves had been placed with Italian manufacturers; British firms had failed to provide the necessary boiler plant, and in consequence boiler shops in shipyards were being utilised, whereas if the Authority utilised its powers under the Act, the industry would, in his opinion, be self-contained without relying on private industry.

Compensation

Concern over the number of resolutions which were withdrawn at the opening of the conference was expressed by Mr. D. Fido, of Tooting, on Monday, but Mr. Foulkes assured the delegates that no undue pressure had been brought to bear, and that the motions had been withdrawn after those backing them had been in consultation with the Standing Orders Committee. One of the resolutions involved, pressed for equal rates for electricians in the supply and contracting industries; another requested the Executive to redouble their effort to obtain an agreement with the B.E.A. to get rates and conditions for employees in their installation departments comparable with the national agreement for the supply industry. A resolution urging negotiation for the consolidation of the temporary bonus into the basic rate for workers in the contracting industry was referred to the Executive for consideration.

On Tuesday, several motions from the Special Executive Council of the Union were debated. In one of these it was suggested that the nationalised industries, particularly the Electricity Supply Industry should not be burdened with compensation charges, such amounts should be charged to the National Debt Fund. It was also proposed that interest on stock should be reduced by 50% and limited to a period of 25 years.

Another of the motions stressed the need for a greater degree of workers' control in management and representation in the nationalised industries, and, noting that there were persons engaged in such industries who were actively opposed to the principle of nationalisation, it was urged that these should be replaced.

The Executive Council's report, presented at the Conference, shows that membership of the Union increased by 5,745 during the year to December 1949. It is disclosed that the earlier proceedings to acquire a building at Beckenham for use as a college have fallen through, it now being necessary to look for other premises.

Regarding the country allowance applicable to employees in the electrical contracting industry, which was increased from 4/6 to 5/- a night last July, a further application has been made for a substantial increase in the allowance.

NEW LITERATURE

Newnes' Electrical Pocket Book

ed. E. Molloy

IN its tenth edition this well-known reference work takes account of recent developments in magnetic alloys and of the introduction of the ring main circuit into domestic wiring. There is also some additional information on fluorescent lamps and on superconductivity. The general plan, however, remains as in the ninth edition, with short articles on a wide range of topics backed by circuit diagrams and some useful tables. Published by George Newnes Ltd., 383 pages, 6¼ in. by 3¾ in. Price 7s. 6d.

Q. and A. on Electric Motors

by E. Molloy

A WIDE range of motors and control gear is dealt with in this small volume, which concentrates on the more important practical problems which arise in installation, operation and maintenance. Amply illustrated with circuit diagrams and drawings, and containing several useful tables, it should prove of interest to most electricians and maintenance engineers. Published by George Newnes Ltd., 120 pages, 6 in. by 4 in., 4th edition. Price 5s.

Electrical Who's Who

TO some it may seem odd that a volume of biographies of electrical personalities has not been published before, for there is no lack of available material. There were, of course, somewhat similar earlier publications which covered the engineering sphere as a whole, but in view of the importance of the electrical industry a separate volume has become essential. Thus, the new publication should find a ready home among the works of reference. It makes no pretence at being a comprehensive Who's Who of the industry, but, comprising as it does over 2,000 names with brief biographical details, the majority of the senior people are included. It is not difficult to discover omissions, of course, but nevertheless there are many who will find the book of immense value. Published by Iliffe and Sons, 204 pages, 9 in. by 6 in. Price 12s. 6d.

Power System Stability

WHEN Mr. K. W. WARDROP, B.SC.(Eng), A.C.G.I. (A.E.I.), recently read a paper on "Power System Stability" to the I.E.E. London Students' Section, it was the first time that the subject had been dealt with in the present I.E.E. lecture theatre.

As a start, the characteristics of the alternator-line-motor link were considered mathematically, and it was shown how the power that can be transmitted varies sinusoidally with the electrical angle between the sending and receiving end voltages, and with the relative magnitude of those voltages. The analysis showed that there was a maximum power that could be transmitted, and that attempts to exceed this load lead to instability. Next came a consideration of the conditions applying when a load was suddenly applied to a circuit. The power/angle diagram was again used as a basis, and it was demonstrated that angular deceleration of the motor supplies the extra power required in the first instance, further retardation being necessary to restore the original speed. This in turn leads to oscillations about the mean angular displacement value, which are gradually damped out. If the oscillations involve swinging much past the angle for maximum power, however, the consequent decrease in power input may result in the motor falling further and further back instead of oscillating about a fixed displacement. This condition is called transient instability, and may also be caused by a fault on the transmission system.

A final form of instability is known as excitation instability, and may be caused by reducing the rotor field current to such a value that the electrical torque is exceeded by the mechanical torque, so that effectively rotor and stator fields move relatively one to the other.

For an example of the practical application of these problems, Mr. Wardrop considered a ring main system with six interconnected power stations, and analysed the response of this system to a fault near the largest of the stations. He showed curves of relative angular displacement illustrating what occurred when the system load was mainly on this one station and when it was carried evenly, instability occurring in both these cases. Finally, he showed by another analysis how the introduction of an extra tie-line into the system allowed synchronism to be maintained.

In planning a power system an assessment of the system stability is often desirable, and for this purpose an a.c. network analyser presents a practical method of performing the required calculations. Transient stability limits for multi-machine problems, expressed in forms of swing curves, are evaluated using the basic idea that in any rotating mass the power working on the inertia, plus the output power, equals the input power. This leads to an expression making the angular acceleration directly proportional to input power-output power, and the resultant equation is solvable in terms of angle, time, frequency, and the inertia constant of the machine involved. The technique adopted is to assume the differential power constant for a short period of time, usually 0·05 sec., and to calculate rotor movements during this period. At the end of this period the new differential power is found and the process repeated.

In the discussion following the paper it was emphasised that the calculations are approximate, and have not been checked by full scale experiments in this country. They must give an answer that has a margin of safety if they are to be usable.

THE WEEK

INDUSTRY *in news* COMMERCE

British Electrical Exports

TWO SUBSTANTIAL export orders from Argentina have been obtained by British Insulated Callender's Cables Ltd. as a result of tenders submitted through their agents, Messrs. Colson, Brookhouse and Pyne Ltd. The two orders call for the manufacture and supply of over 4,500 yd of varnished cambric insulated lead-sheathed cable (including single-core and three-core types for 1,000 V and 10,000 V working), and for a total of 342·5 kVAR of power capacitors. The equipment is to be used by Acindar Industria Argentina de Aceros, S.A., in connection with their new steel mills extension.

Orders for a total of 3,815 core miles of switchboard wire have been awarded by the Australian Post Office to B.I.C.C. Delivery, which commenced last November, is at the rate of 80 core miles per week. All orders are expected to be completed this August.

A further order for communications equipment from the Belgian Government is announced by E. K. Cole Ltd. This is in addition to a large order placed with the firm last November, and brings the total value of business with this hard currency area to more than £80,000 in the last six months.

I.E.E. Wiring Regs.—Reprints

AS A result of numerous enquiries from readers, we are reprinting the review and accompanying table of the twelfth edition of the I.E.E. Wiring Regulations (as published in our issue of May 11). Copies will be obtainable price 3d. each, postage 1d. (postage free on more than a dozen copies). Readers are advised to place orders early.

Management under Discussion

THREE eminent people will be speaking on subjects of vital interest to present-day management at the spring conference arranged by the British Institute of Management. They are: Mr. Nigel Balchin, author and broadcaster, on "Managers: Are They Human?"; Mr. W. J. Kenney, Minister i/c Economic Co-operation Administration, U.K., on "The Challenge to British Management," and Professor G. D. H. Cole, Chicele Professor of Social and Political Theory, Oxford University, on "Management and Democracy."

It is expected that some 700 delegates will attend the conference, which begins today at Cliftonville, near Margate. Fifteen sectional meetings will cover practical problems relevant to industrial management practice, and some 64 informal discussion subjects have been arranged on a wide range of managerial topics.

Information Theory

A SYMPOSIUM on Information Theory is to be held in the rooms of the Royal Society from September 26-29. The programme will discuss, in particular, the recent work of Dr. C. Shannon of the Bell Telephone Laboratories, N.J., who will himself present two papers. Of interest to mathematicians, physicists, physiologists and communication engineers, those wishing to attend are asked to write to Prof. Willis Jackson, Electrical Engineering Dept., Imperial College, London, S.W.7.

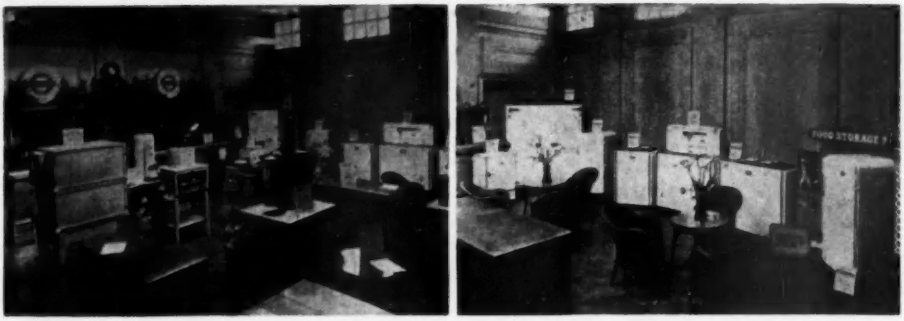
The Industry's New Films

A NEW film, titled "More Power," which has been produced for the British Electricity Authority, was shown for the first time on Thursday last in London. Depicting the work now progressing on many of the new generating stations under construction throughout the country, it refers to some of the difficulties which have to be overcome, and includes shots of a number of the stations and of the work on plant at the factories. The documentary is by Lord Citrine.

This was followed by three new films, made for E.D.A., with electricity in agriculture as their theme. Two of these, illustrating the theory and practice of electric power on the farm, and intended to assist in the electrical education of agricultural students and young farmers, are titled "The Line to Take" and "Power on the Farmyard." The first of these concerns the respective merits of a single- and three-phase supply, but we feel that it may confuse some farmers who are confronted with the problem of which supply to take. Although stressing that a single-phase supply is the best for most farms unless large motors are to be used, much of the length of the film is devoted to a simple explanation of a three-

The First Half-Century

The next witness (in the fight over the Electric Power Bills) was Mr. Worth, of the Acetylene Manufacturing Co. He said that the lowest price he could ever get from any electric supply company was a halfpenny a unit, but that was prohibitive. After some hesitation, Mr. Worth said the price agreed upon with the Tyneside promoters was about half a farthing per unit, the supply to be for a minimum of 5,000 h.p.—*From our issue of May* 17, 1900.



Two sections of the cooking equipment exhibition arranged by the Eastern Board at Clacton-on-Sea

phase supply in which the latter's advantages in transmission are emphasised. The other film, "Power on the Farmstead," gives a graphic indication of many of the applications of electric motors. A third film, "Fifty Acres," of the more popular type, presents the story of how a farm was saved from lapsing into decay and restored to prosperity by the installation and application of electricity.

Introducing the films, Lord Citrine remarked that rural electrification would have to take its share of the cut in capital expenditure along with other distribution work. It had been proposed to spend £51 million on distribution work in the current year, but now only £35 million would be spent.

Northern Ireland Strike Threat

THE Northern Ireland branch of the Electrical Power Engineers' Association has given 21 days' notice of the intention of the technical staff engaged in the electricity supply industry to withdraw their services on May 29. The supply undertakings concerned are the Northern Ireland Electricity Board and Belfast and Londonderry Corporations. The withdrawal notice issued has arisen out of a claim for parity in salaries of similar staff in Britain. In response to a request by the Electricity Board, Mr. H. Norton, deputy general secretary of the E.T.U., travelled to Ulster yesterday to discuss the matter.

Electricity in Science

PORTABLE galvanometer equipment measuring to within 40 micro-micro amps was included in the interesting display of scientific apparatus and methods on show at the Royal Society Conversazione, held at Burlington House last Thursday. The instrument which is used in biophysical research at University College, London, has the light beam from a sensitive low-resistance galvanometer playing on a pair of side-by-side photo-electric cells. The differential output of these is amplified in a d.c. amplifier and fed out to a microammeter. When used for temperature measurement with a single thermocouple changes as small as 5×10^{-5} C. can be detected. Another exercise in accuracy was the N.P.L. cavity resonator which has been used to determine the velocity of electromagnetic waves.

Magnet techniques are well represented, the Permanent Magnet Association presenting a display which included Alcomax magnets which had been specially prepared to have columnular crystal structure along a preferred axis. In this way, which is not yet a commercial proposition, BH_{max} is increased from 5×10^{6} to 8×10^{6} gauss-oersteds. The Hall effect in germanium crystals as a means of exploring a magnetic field was demonstrated by the G.E.C.

Two stands dealing with fluorescent lamp phenomena were also manned by G.E.C. Research Laboratory staff. The first showed halo-phosphates activated by antimony and manganese, which allow white light to be obtained from a single fluorescent material, while on the other, the effect of temperature on fluorescent lamps was demonstrated by cooling part of a tube, the reduction in luminous efficiency being readily visible.

Amongst the more general exhibits were several examples of the wide range of applications being found for cathode-ray tubes, including an electronic camera which can show detail occurring in 10^{-9} of a second. Even the most "popular" of the exhibits, a long sequence of underwater moving photographs taken by the Royal Naval Scientific Service, had some electrical interest, for the path of a telegraph cable on the sea bed near Malta was shown in some detail.

Caterers see Cooking Methods

WITH THE 1950 season almost upon them, hoteliers, caterers and proprietors of boarding houses in Clacton showed keen interest in the three-day exhibition of catering equipment recently organised by Suffolk sub-area of Eastern Board. In the resort's Essex Hall exhibits which attracted most attention were the Staines auto-sink and a glass washer by the same maker. A Crypto-Rotopan cooker was demonstrated daily, and Creda restaurant ranges and grillers were also on show.

Devon County Show

S.W. BOARD have specially erected nearly a mile of 11,000-volt overhead line, over half a mile of low-voltage distribution line and a 500 kVA trans-

former to provide electricity supplies for the Devon County show which opened at Chivenor aerodrome on Tuesday. The work was carried out by the Board's Barnstaple district staff.

The Board's stand at the show has a newly-designed entrance pavilion with mural displays to show the farming community the scope of the Board's existing services, and the progress so far made in bringing electricity to rural areas in the South-West.

Sales Conferences

SOME 80 delegates from 36 different countries have assembled in Harrogate this week for a conference arranged by Steels Engineering Products Ltd. Steels—manufacturers of mobile cranes and other mechanical handling plant—have taken over the Prince of Wales Hotel until next Thursday in an effort to promote greater overseas sales.

In addition to all home district office managers overseas representatives of the Brush organisation recently attended a sales conference held at the Falcon Works, Loughborough.

Atmosphere to Order

THE ELECTRIC furnace shown in our illustration is a G.E.C. 70 kW batch type annealing furnace for annealing and forming an oxide coating on silicon-iron stampings for the stators and rotors of squirrel-cage electric motors. The entire process takes place in an atmosphere of partially burnt town gas and results in the stampings acquiring the correct magnetic characteristics together with the necessary coating of oxide as an electrical insulator. Both the oxidising and annealing operations demand careful control in cooling as well as heating. The whole process is governed by automatic control equipment.

The correct atmosphere is produced by a G.E.C. atmosphere plant on the right of the furnace. It consists essentially of a town-gas burner which is supplied with a limited amount of air, so that the gas is only partially burnt. The plant is capable of producing 300 cubic feet of atmosphere per hour, which is desulphurised before being passed to the furnace chamber.

More B.E.A. Contracts to Shipyards?

POSSIBILITY of unemployment in the shipbuilding and repairing trades has led the T.U.C. production committee to suggest that shipyard labour could be transferred to the production of generating plant, it was disclosed last week.

Meetings have been held with B.E.A. and representatives of draughtsmen and engineering workers in the Clyde area, say the T.U.C. Suggestions made were that more engineering firms should be asked to make generating plant with the inducement of a five years' contract; that the possibility of obtaining valves and piping from soft currency areas should be looked into; that contracting firms should train scarce grades of workers so that more night shifts could be started, and that further standardisation should be encouraged.

Wonders of Electrical Age

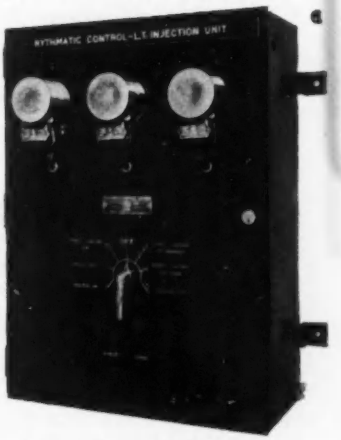
"WORKING Wonders of the Electrical Age" is the title of an exhibition which opens at the Music Hall Buildings, Aberdeen, next Tuesday. Organised by the North of Scotland H.E. Board, leading manufacturers are co-operating, and the latest developments of electrical engineering will be on show.

Special features of the exhibition will be a 45 ft high transmission tower supplying a group of stands, a "talking" cooker, a model of the experimental windmill generator being erected in Orkney, an electric fountain, and a display of labour-saving devices, including a new type of dish washer.

The Lisburn Story

THE LARGEST fluorescent street lighting scheme yet carried out in the British Isles was formally switched on by the chairman of Lisburn U.D.C.,

G.E.C. batch type annealing furnace and atmosphere plant



The control panel for Lisburn' street lighting

Mr. A. N. Stephenson, recently. Eight miles south of Belfast, N. Ireland, Lisburn now possesses the most advanced street lighting obtainable.

The scheme embraces a complement of 170 lanterns each containing three 80-watt fluorescent lamps together with nearly 400 Class "B" lighting lanterns and standards, all supplied by Siemens Electric Lamps and Supplies Ltd. "Rythmatic" ripple control equipment, manufactured by the Automatic Telephone and Electric Co. Ltd., controls each lamp.

Standby Lighting for Scheldt Tunnel

KNOWN by thousands of motorists who have toured the Continent, the famous Scheldt Tunnel running north and south from Antwerp has been equipped with two large Alklum nickel-cadmium alkaline batteries for standby and emergency lighting. Each of 240-volt, 200 ampere-hours capacity, the batteries have been installed to safeguard traffic from risk of accident in the event of a failure to the normal lighting system.

The tunnel, which begins at the centre of Antwerp in the Avenue d'Italie, is nearly 1¼ miles long and has a carriage width of approximately 22 ft. The greatest depth reached under the Scheldt is more than 114 ft.

E.P.E.A.'s Attitude to Unofficial Strikes

AT THE recent meeting of the General Purposes Committee of the Electrical Power Engineers' Association, a general discussion took place of the Association's attitude to unofficial strikes in the industry. It was agreed that the E.P.E.A. remains opposed, absolutely, to all unofficial action. In any other dispute between employers and employees, each case should be looked at on its merits, the bias of goodwill being towards that party to a dispute prepared to submit the issue to negotiation.

Fluorescent at Speed

FLUORESCENT lighting is being used to illuminate instruments in the record-breaking de Havilland "Comet" jet air liner. G.E.C. have supplied eight Osram 2 ft 40-watt natural colour lamps, with their associated chokes, starters and capacitors. The chokes are of the company's recently introduced lightweight toroidal type, which weigh only 4 oz. each.

Eight lamps are mounted vertically in pairs in front of the engineer's instrument panel, to provide light for photographic recording by the automatic observer. Two pairs of lamps in vertical reflectors face each side of the panel.

Scotland's T.V. Site Approved

THE B.B.C. has now received approval from Lanark County Council for erection of the first Scottish television station. The site is five miles west of Harthill at Kirk o' Shott, and the buildings to be erected include a single storey transmission station, a substation, mess room and garage. A transmitting mast, similar to that at Sutton Coldfield, will rise to 750 ft.

Atom Jobs for Mechanics

MECHANICS with a flair for experimental work are being sought by the Ministry of Supply to fill posts in the Sellafield, Cumberland, factory of the Ministry's atomic energy production division. Men especially required are those experienced in assembling or repairing recording instruments using electrical, pneumatic and other methods. They are wanted for research and experimental work.

Qualifications for the posts are: an apprenticeship served in instrument engineering or radio, radar or electrical engineering, or equivalent Forces experience. Enquiries should be sent to the Superintendent, Windscale Works, Sellafield, Cumberland.

Twenty-first Exide Convention

ONE OF the most popular meetings in the battery industry—the Exide service agents' convention—comes of age this year, when the twenty-first of these annual events is held at Bournemouth on June 21-23. Hundreds of delegates from all over Great Britain and from abroad will take part in a full programme that includes, besides a number of business sessions, the customary social functions including the famous Exide banquet and ball.

NEWS IN BRIEF

Sheffield's first all-metal tram commenced service on Saturday. Fitted with shaded diffused lighting, the new tram cost £6,800. Others will follow at the rate of two or three a month.

"Brush" apprentices—who have now formed the Falcon Association—will hold their first reunion in a Leicester hotel on September 29.

Glover's first visitors' day at their Trafford Park works was a great success. Some 2,300 friends of employees saw a skeleton plant, manned by volunteers, in actual operation. Explanations of the various processes were given by the employees themselves and small exhibitions were arranged by each department.

A summer school in programme design for automatic digital computing machines is to be held this year in the University Mathematical Laboratory, Cambridge. The dates are from September 12 to 21, and details are obtainable from G. S. Hickson, secretary of the board of extra mural studies, Stuart House, Cambridge.

A demonstration team from Pye radio is putting on full-scale broadcasts in Gothenburg's famous Lisebury Gardens.

Novel form of works outing arranged by George Ellison Ltd. and their associate company, Tufnol Ltd., was a flight to Amsterdam. Fifty-two employees went last Saturday and a second flight will leave this Saturday.

Questions in Parliament

Electricity and Capital Expenditure

Replying to a question, Mr. Noel Baker stated there was no intention to cut the total annual capital expenditure for electricity supply below the present rate. But proposals put forward by the electricity boards must be considered in conjunction with proposals for capital expenditure on all other essential requirements, and he could not give an assurance that all the boards' proposals would be accepted for immediate execution without amendment.

North Wales Schemes

A model of the country affected and of the proposed North Wales hydro-electric schemes would be placed in the library of the House of Commons after the Whitsun recess, Mr. Noel-Baker stated in reply to a question by Mr. Marples. The latter member then asked what was the estimated extra capital cost of the schemes over a coal-fired station of similar output, and how was the extra cost divided between civil engineering and generating plant? Mr. Noel-Baker answered that the necessary surveys were not yet complete, but at the appropriate moment all the information will be available.

N. of Scotland Schemes

Questioned about electricity in the Outer Hebrides, Mr. McNeill said in Lewis distribution lines were at present being erected in the Eye Peninsular and in the Tolsta area. Work had begun on the lines from Stornoway to Barvas and to Ness.

Asked in what districts the expenditure by the North of Scotland Hydro-Electric Board of £2·1 million for main transmission and £2·3 million for distribution would take place, Mr. McNeil gave the following list: Sloy-Glasgow; Tummel-Garry-Bonnybridge; Fannich-Boat at Garten; Keith-Aberdeen; Fasnakyle-Beauly; Shira-Inveruglas; Tummel Bridge-Inveruglas; Aberdeen-Dundee; Fasnakyle-Fort Augustus.

Electricity Officers' Compensation

After Mr. H. Morrison had formally moved that the Draft Electricity (Commissioners and Others) (Compensation) Regulation, 1950, be approved, Mr. Robens explained that these regulations were in two parts. Part I dealt with members of the C.E.B., and the other part with compensation to officers of the Electricity Commission. With regard to the C.E.B. of the five part-time members, two died shortly after dissolution. With the remaining three, the unexpired period of office ranged from about 10 months to 2 years 8 months. Turning to the Electricity Commissioners, one was now chairman of an Electricity Board, one is retained by the Minister in a consultative capacity and the other is a part-time member of an Electricity Board. In regard to Part II of the Regulations, there were 128 officers involved. Of these, 103 were transferred to the Ministry of Fuel and Power and are on the staff there now; the other 25 were transferred to the electricity industry. All, therefore, were working under conditions or at emoluments no worse than they had previously with the Commission. If, within 10 years, their position worsened, it is deemed to have been as a result of the 1947 Act. These Regulations were merely a safeguard.

In the debate, Col. Crosthwaite-Eyre suggested that under the Regulations, the onus of proof of worsening of position was not on the Board but on the individual who tried to make his case. Later he asked why it provided for members of the C.E.B. to be compensated by a lump sum whereas the officers could only draw between 75% and 100% of the total award of compensation that may be made to them? On one hand there were the officers, whose compensation would be in the form of an annuity on which income-tax would be paid, while, on the other, the commissioners would get a lump sum on which no tax would be paid. This was an extraordinary state of affairs for a Socialist Government to be in, particularly one that was so hot against Mr. Lord and Sir John Black. Under the regulations, it was promoting the tax-free grant of lump-sum compensation. The eight-year qualifying period and the limit of £4,000 applied to officers, but not to commissioners, be maintained.

Other members, too, made the point that the Regulations were discriminatory, and questions were asked as to whether the lump sums would be liable to income tax or not. Replying to the debate, Mr. Robens said that the difference in treatment was because of the differing circumstances of each case. He was not prepared to give an answer regarding liability for taxation. The Regulations were approved.

Earlier, in question time, the Chancellor of the Exchequer was asked whether his regulations prescribe that compensation payments by nationalised industries for loss of office and emoluments shall be free of tax. He answered that the question of income tax liability on such payments depended on the facts of each case.

Electricity Supplies (Wales)

Replying to a question by Mr. E. Roberts, the Minister of Fuel and Power said the amounts of electricity sold to consumers in Wales and Monmouthshire, including a part of Cheshire, were 2,752 million units in the year ending December 31, 1949, and 2,666 million in the year to March 31, 1949. Units generated over the same periods were 2,823 million and 2,965 million respectively.

Television (Wales)

The Postmaster-General was asked what progress was being made in finding a suitable site for the television to serve Wales. He replied that B.B.C. engineers had made tests at three sites in the Bristol Channel area and the results were being analysed, but it had not yet been decided which is the most suitable or whether further tests will be necessary.

Electric Supply News

Burton-on-Trent

In connection with the planning permission for the erection of the Drakelowe power station, arrangements have been made for a gravel contractor to work the land alongside the station. Originally it was intended to tip ash from the boilers over about 250 acres of land in Drakelowe Park. The whole of the park is known to overlie a bed of gravel 15-20 ft thick. At the same time as the plans for the station were being prepared the Advisory Committee on Sand and Gravel was investigating the future needs of land for gravel working in the Burton area. With co-operation it has been found possible to bring the two schemes together, and the gravel pits are to be filled with ash and covered with top soil.

Cumberland

The great need for electricity supplies in the remote areas of Cumberland, particularly in the Lake District in Borrowdale, if overseas visitors were to be attracted, was emphasised at last week's meeting of the Cumberland County Council.

Crewe

The 132 kV transmission line between Crewe and Knutsford, for the Merseyside and North Wales Division, has now been formally approved by the Minister of Fuel and Power. The line is designed to form a connecting link in the 132 kV system to deal with large flows of power between Lancashire and the Midlands. It is expected that the new line will be in commission in the summer of 1951.

Eastern Board

In the reorganisation scheme being carried out by Vauxhall Motors Ltd. at Luton, an additional 8 MW bulk supply is to be taken from the Eastern Electricity Board. In the near future, the firm's loading will be in the region of 20 MW. The first part of the expansion programme is now nearing completion.

Northern Ireland

In the first four months of this year, the Electricity Board of Northern Ireland had approved 200 rural schemes, stated Mr. W. V. McCleery, Minister of Commerce, last week. These schemes would supply 2,500 new consumers including 741 farms, over 1,600 rural dwellings and about 150 other premises such as halls, shops and garages. Many of the schemes, however, did not show promise of an economic return. To meet the future demand, the Ministry has approved a recommendation by the Joint Electricity Committee that four additional 30,000 kW generating sets be installed over the period 1953-57. A scheme covering the initial installation was being prepared.

A Bill was introduced in the Northern Ireland Parliament last week, having as its object the drainage of the Lough Erne area and the development of hydro-electric power. The two Governments have agreed on the scheme.

Salisbury

The Salisbury substation of the Southern Electricity Board was the scene of a recent unusual fault which resulted in heavy damage to the insulator bushings of a 33 kV oil circuit-breaker. We gather that the white phase bushing on the outgoing side of the c.b. failed, causing an earth fault to develop. The bushing insulator blew to pieces, fragments being scattered up to 35 yards distant. It is assumed that the arc set up by the fault was blown by the wind to the same phase on the busbar side of the o.c.b. Owing to the higher setting of the B.E.A. switches feeding the substation, the arc apparently increased until it reached the red or centre phase of the breaker, thereby creating a short circuit. The severity of the arc caused damage to the other insulators on the switch by fusing and flying pieces of porcelain. The fault caused a total failure of supply to the district for about four minutes, the incoming B.E.A. 33 kV switches tripping out. Repairs were carried out by the local staff, including the fitting of six new 33 kV bushings.

Worcester

The small Powick water-power station is to be closed down, for repairs which are necessary make it uneconomic, the Midlands Division has decided. This, the only hydro-electric station operated by the Division, started up in 1894. The plant, of a total installed capacity of 320 kW, consists of two water turbines direct coupled to a Westinghouse 250 kW alternator, and by ropes to a 70 kW dynamo.

LIGHTING SCHEMES

Jarrow.—M.o.H. has approved the erection of 61 street lights on the South Leam estate, at a cost of £2,083.

Newark.—It is proposed to apply to the M.o.T. for approval of a scheme for lighting London Road, Lombard Street, Castlegate and Millgate, at an estimated cost of £3,600.

Newry.—The U.D.C. has received five tenders for the installation of fluorescent lighting in the section of the Belfast-Dublin trunk road.

Newtownards.—The Council has placed an order for the lighting of the town by electricity. There is to be nearly 3 miles of fluorescent, most of the remainder being mercury vapour.

Retford.—A £6,545 scheme for sodium lighting in the main streets of the town has been submitted to the M.o.T.

Scunthorpe.—The borough surveyor is to submit proposals for additional lighting in certain streets. Application is to be made for consent to a loan of £2,915 for providing lighting on Grange Lane estate.

Wantage.—A street lighting scheme which was approved by the Council six years ago has now been approved by the M.o.T., who have also consented to a loan of £7,100 being made to cover the cost.

Company Activities

Allen West & Co.

Consolidated trading profit for the year to January 31, was £722,728 (*£714,267*), plus investment dividends £6,547 (*£499*), and profit on foreign exchange due to devaluation £5,139 (*nil*), making £734,414 (*£714,766*). Taxation absorbs £334,645 (*£339,988*), directors' emoluments, etc., £34,572 (*£28,940*), pension fund and annuity premiums £19,408 (*£22,214*), depreciation and amounts written off £60,342 (*£57,650*), expenses of issue of shares £4,071 (*nil*), and audit fee £1,121 (*£1,163*). With £150,813 (*£140,747*) brought in there is £430,279 (*£384,329*) available. To capital reserve of Allen West £77,431 (*nil*), and general reserve £150,000 (*£200,000*). After dividends, etc., there is £119,223 carried forward.

Associated Electrical Industries

Aggregate trading profit for 1949 was £7,601,904 (*£6,219,892*), plus dividends on trade investments £156,814 (*£140,060*), and profit on sales of investments and miscellaneous assets £3,410 (*£72,926*), making £7,762,128 (*£6,432,878*). To interest on ten year Notes £101,418 (*nil*), depreciation £912,797 (*£832,580*), for increased replacement cost of fixed assets £500,000 (*nil*), audit fee £10,674 (*£8,432*), additions to provisions £30,213 (*£179,894*), U.K. profits tax £915,174 (*£818,998*), income tax £2,603,557 (*£2,067,081*). Consolidated net profit was £2,688,295 (*£2,525,893*), attributable to minority holdings in subsidiaries £3,459 (*£4,245*), and balance attributable to A.E.I. carried forward or added to reserves in books of subsidiaries £412,334 (*£564,727*). Available for appropriation by A.E.I., £2,272,502 (*£1,956,921*). Transfer from taxation provisions no longer required £250,000 (*nil*). To general reserve £1,250,000 (*£1,024,438*), other reserves £520,671 (*£314,048*), discount and issue expenses of Notes £75,000 (*nil*), Preference dividends £117,446 (*same*), Ordinary dividend £495,000 (*same*), leaving £482,166 (*£417,781*) carried forward. Total assets are listed at £51,307,756 (*£49,008,930*), and liabilities and provisions £20,187,294 (*£21,154,062*).

British Insulated Callender's Cables

Group results for 1949, according to the preliminary statement, show a trading profit of £6,738,264 (*£6,596,476*). There is recommended a final Ordinary dividend of 4⅜% (11·2d. per £1 unit) making 6¾% for the year. Income from investments (gross) is £102,962 (*£111,475*), and receipts applicable to earlier periods and provisions no longer required £207,030 (*£642,083*). Profit on realisation of assets nil (*£13,343*), making revenue from all sources £7,048,256 (*£7,363,377*). Depreciation on fixed assets takes £771,131 (*£745,031*), interest £85,738 (*£43,125*), transfer to provisions £135,023 (*£326,350*), underwriting and issue expenses written off by subsidiary £24,000 (*£1,610*), to taxation £3,150,567 (*£3,577,527*), giving a net profit of £2,881,797 (*£2,669,734*). Proportion attributable to the holding company is £2,628,835 (*£2,337,791*). Transfer to capital reserve £4,630 (*£40,130*), to revenue reserves £2,046,466 (*£1,391,954*), Preference dividends £62,425, Ordinary interim £101,644 and final £237,170 (*all same*), leaving a surplus of £176,500 (*£504,468*) which is added to the carry forward, making it £1,292,059 (*£1,115,559*).

British Thermostat Co.

Preliminary statement shows profit of group, after all charges, including taxation, of £153,651 (*£139,039*). There is a final dividend of 22½% (17½%), making 30% (25%). U.K. taxation charged amounts to £148,250 (*£157,881*). To reserve account £50,000 (*same*).

British Vacuum Cleaner & Engrg. Co.

For the year to September 30 last, trading balance was £106,691 (*£94,657*), plus other income £12,964 (*£1,559*). To bank interest £14,387 (*£18,665*), directors' emoluments £14,278 (*same*), written-off sub-subsidiary's expenses £4,960 (*nil*), depreciation £22,142 (*£31,078*), leaving £63,888 (*£32,195*). To profits tax £9,276 (*£10,000*), income tax £15,700 (*£16,988*), income tax adjustments £2,791 (*nil*), Canadian taxation £924 (*£2,054*), Preference dividends £4,538 (*same*), Ordinary 20% £16,500 (*same*), leaving £43,272 (*£31,612*) carried forward.

Lancashire Dynamo and Crypto

The consolidated profit and loss account shows a trading profit of £384,639 (*£369,164*) for 1949, plus investment income £11,862 (*£11,042*), making £396,501 (*£380,206*). To depreciation £42,747 (*£37,509*), directors' fees £5,589 (*£5,545*), and other emoluments £31,154 (*£28,361*), profits tax £47,350 (*£46,000*), income tax £112,610 (*£119,220*), South African taxation £6,057 (*£2,965*), leaving net profit £150,994 (*£138,106*). With £241,678 (*£208,969*) brought in there is £392,672 (*£347,075*) available. Dividends absorb £83,016, and profit attributable to outside interests £954, leaving £24,373 (*£10,076*) carried forward by subsidiaries, and £284,329 (*£230,784*) by L.D.C.

Dividends Declared

Barton & Sons. Final Ordinary dividend of 7% (4%), making 10% (7%). Consolidated net profit, including dividends from subsidiaries, is £112,136 (*£88,690*).

Calcutta Electric Supply Corpn. Final dividend of 3%, making 6%, tax free.

Newman Industries. Dividend of 10% (17½%). Group profit, after tax, is £22,776 (*£49,633*).

River Plate Electricity and Other Securities Corpn. Final dividend of 5%, making 8% (*both same*).

Sydney S. Bird & Sons.—First and final Ordinary dividend of 12½%. Group profit, after tax, £5,834 (*£5,268*).

Commercial Information

CONTRACTS OPEN

HOME

May 18.—Buckie T.C. Electrical work for four blocks (two four-apartment houses) and five blocks (four three-apartment houses) at Hendry Terrace and Scott Terrace site. Borough Surveyor's Office, Town House, Buckie.

May 19.—Cumberland C.C. Electric wiring and fittings at Station View House, Penrith. J. H. Haughan, County Architect, 15 Portland Square, Carlisle.

May 19.—Edinburgh T.C. Electrical installations for 172 houses on Old Saughton housing area. City Architect, City Chambers, Edinburgh.

May 19.—Lancashire. Year's supply of twin lighting flex, lampshades and lampholders, dry batteries and bulbs. Chief Officer, County Fire Brigade H.Q., "Hazelmere," Garstony Rd., Broughton, Preston.

May 20.—Annan T.C. Provision of 13 tubular steel columns, 25 brackets and 28 lanterns, with 240 W mercury electric discharge lamps; erection of 22 columns and installation of equipment on trunk road A.75. A. Knox, Town Clerk, Town Hall, Annan, Dumfriesshire. (See our Apr. 20 issue.)

May 20.—Chorley T.C. Electrical installation in pre-war houses. Separate tenders. (1) The Crescent, 30; (2) Harrison Road, 12; (3) Rangletts, 23; (4) Highfield, 37; (5) Marlborough Street, 23; (6) Ashby Street (including 16 flats), 49; (7) Wordsworth Terrace (including 12 flats), 46. Borough Engineer, Town Hall, Chorley.

May 20.—Sunderland T.C. Electrical installation in 276 houses on Pennywell estate. Borough Architect, Grange House, Stockton Rd., Sunderland. Deposit £1. (See our May 4 issue.)

May 22.—Batley T.C. Supply and erection of 17 electric street lamps on Leeds-Huddersfield trunk road. Borough Engineer, West House, Hanover St., Batley.

May 22.—Belfast. Electrical installation at Downpatrick Chest Hospital. W. Harvey, Secretary, N. Ireland Tuberculosis Authority, 27 Adelaide St., Belfast.

May 22.—Brighouse T.C. Installation of electric wiring and fittings for 139 houses on Smith House estate. Borough Engineer: H. A. Sneezum, Commercial Street, Brighouse.

May 22.—Manchester T.C. Electrical installation for adaptations to provide police divisional headquarters at St. Joseph's Buildings, Longsight. City Architect, Town Hall, Manchester. Deposit £1 1s. (See our May 11 issue.)

May 22.—Musselburgh T.C. Electrical work for 27 houses at Beach Lane and Links Avenue. Burgh Surveyor, Municipal Offices, High St., Musselburgh.

May 22.—Thirsk R.D.C. Internal wiring of 18 houses on various sites. Architects: Needham and Thorp, 6 High Petergate, York.

May 23.—Southend-on-Sea T.C. New electrical installation for electrical machines laboratory, London Road Schools. Architect to Education Committee, Southend. (See our May 4 issue.)

May 25.—Clutton R.D.C. Electrical installation in 12 houses at Camely, 20 at Chilcompton, 20 at Clutton, and 10 at West Harp Tree. Thomas and Morgan and Partners, 23 Gelliwastad Road, Pontypridd. Deposit £1 1s.

May 25.—Rothwell U.D.C. Electrical wiring of 64 houses on Laurence Villa site, Woodlesford. Architect, Civic Buildings, Rothwell.

May 27.—Hemel Hempstead T.C. Year's supply of electric lamps and repairs to Venner time switches. A. H. Turner, Borough Engineer, Market Square, Hemel Hempstead.

May 29.—Penzance T.C. Installation of electric motors, gearing, etc., for operation of Penzance floating dock gates. D. J. Beattie, Town Clerk, Municipal Buildings, Penzance.

May 29.—Sutton Coldfield T.C. Supply of pre-cast concrete lighting columns and brackets to Falcon Lodge estate. Borough Surveyor, Council House.

May 30.—Swadlincote U.D.C. Supply and erection of 49 Class A 250 W mercury discharge lamps with standards, 16 Class A 240 W fluorescent-type lamps with standards, and 68 Class B 100 W tungsten-type lamps with standards. Engineer and Surveyor, Bark House, Swadlincote. Deposit £1 1s.

May 31.—Ashton-under-Lyne T.C. Electrical wiring for 96 houses on Crowhill estate (Housing site No. 4). A. T. Kemp, Borough Engineer and Surveyor, Municipal Offices, Ashton-under-Lyne. Deposit 10s. Advertised in this issue.

May 31.—Halifax E.C. Electrical work at schools swimming centre, Park Road baths. Borough Engineer, Crossley Street, Halifax. Deposit £3 3s. Advertised in this issue.

May 31.—Twickenham T.C. Supply and erection of one four-body refrigerator at Hampton Mortuary, Borough Engineer, York House, Twickenham.

June 6.—Manchester E.C. Electrical engineering equipment for Municipal College of Technology. Chairman, College of Technology sub-committee, Education Offices, Deansgate, Manchester 3. (See our May 11 issue.)

June 7.—Winsford U.D.C. Installation of electric wiring in 150 pre-war houses. P. Heaton, Surveyor and Engineer, Council Offices, Over Hall, Winsford.

June 8.—Camberwell T.C. Installation of cremation furnaces at Honor Oak crematorium. Borough Engineer and Surveyor, John Clapp, Town Hall, Camberwell, S.E.5. (See our May 11 issue.)

June 12.—New Windsor. Electrical installation to 30 houses to be erected on Imperial Road site. Borough Engineer, Kipling Memorial Building, Windsor. Deposit £1 1s. (See our May 11 issue.)

June 21.—N. Scotland H.E. Board. 132 kV double circuit steel tower overhead line (approx. 65 miles route length) between Boat of Garten (Inverness-shire) and Aberdeen. Merz and McLellan, 39 Northumberland Street, Edinburgh 3. Deposit £2 2s. (See our May 11 issue.)

July 17.—Waterford C.C. Electrical services comprising lighting, cooking, laundry, sterilising and associated hospital equipment at Ardkeen Sanatorium. (Fourteen major buildings, covering 20 acres.) Engineer, N. Mathews, 104 Grafton St., Dublin. Deposit £15 15s.

No date stated.—Peterborough T.C. Electric lighting and power installations to 12 old peoples' dwellings and 32 single bedroom flats on Dogsthorpe/Newark estate, Peterborough. F. J. Smith, City Engineer and Surveyor, Town Hall, Peterborough. (Applications by May 20.). (See our May 11 issue.)

No date stated.—Newcastle-on-Tyne T.C. Electrical installations to approx. 400 houses in course of preparation on various sites. City Architect, 18 Cloth Market, Newcastle-upon-Tyne.

No date stated.—Breconshire C.C. Electrical installation at Llanfaes C.P. infants' school, Brecon, Glanrhyd C.P. infants' school, Ystradgynlais, Mount Street C.P. school, Handicraft rooms, Brecon, Darrenfelen C.P. school near Brynmawr. Harley C. W. Strickland, County Architect, Rhyd Offices, Brecon. (Applications by May 19).

No date stated.—Durham E.C. Electric installation at Newker House, Chester-le-Street, Modern School. County Architect, Court Lane, Durham.

No date stated.—Sunderland E.C. Electrical installation in various schools. Borough architect, Grange House, Stockton Road, Sunderland.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

May 30.—Johannesburg. Supply, delivery and erection of 80 kV switchgear and accessories. Contract D18/49. Specifications from Merz and McLellan, Carliol House, Newcastle-upon-Tyne 1.

May 31.—Queensland. Supply and delivery of copper conductor and wire and galvanised steel cable wire and copper jointing sleeves, insulators, insulator ironwork, outdoor switchgear, and line construction material. Secretary, State Electricity Commission, Scottish Union House, Eagle St., Brisbane. B.o.T. (Ref. CRE (IB) 52103/50).*

June 1.—British East Africa. Supply and installation of traffic signalling equipment. Town Clerk, Municipal Board, Municipal Offices, P.O. Box 440, Mombasa. B.o.T. (Ref. CRE (IB) 51713/50).*

June 2.—Wellington. Half million rubber insulator rings Specification No. 150/3360. Director-General (Stores Division), G.P.O., Wellington C.1. B.o.T. (Ref. CRE (IB) 52591/50).*

June 2.—Wellington. Fifty multirange meters complete with leads and test probes for Post and Telegraph Dept. Director-General (Stores Division), G.P.O., Wellington C.1, New Zealand. B.o.T. (Ref. CRE (IB) 52593/50).*

June 6.—Wellington. 110 kV outdoor switchgear and structure for Mangahao power station. Contract 148. State H.E. Dept., Wellington. Deposit £100; bond £300.

June 9.—Brisbane. 33,000 V underground and submarine cable, multicore underground and submarine pilot cable. Brisbane City Council Department of Electricity. B.o.T. (Ref. CRE (IB) 47945/50).*

June 13.—Wellington. Thirteen single phase, double wound transformer units, each 9,259 kVA, 11/127 kV, 50 c/s, outdoor type, oil immersed and water cooled to form four 27,777 kVA transformer banks and spare unit for Whakamaru power station. Contract 149. State H.E. Dept., Wellington. Deposit £100; bond £4,500.

June 19.—Tangier. Oil-cooled, 3-phase, 50 c/s transformer from 50-400 kVA. Monsieur l'Ingenieur en Chef des Travaux Publics d'Etat, Administration Internationale de la Zone de Tangier.

June 22.—Montevideo. Transformers for outdoor installation, 10-3,000 kVA; indoor, 100-500 kVA, and lead in insulators. Administracion General de las Usinas Electricas y los Telefonos del Estado, Seccion Adquisiciones, Julio H. y Obes, 1470, Montevideo. B.o.T. (Ref. CRE (IB) 50260/50).*

Your Queries — Answered

"Eltonian" refrigerator, makers of? T.E.—Elton Industrial Distributors Ltd., 50 Elm Gve., Southsea. (18134)

"Picador" polishing head, makers of? T.E.—H. K. Staub Ltd., 59 Farringdon Rd., London E.C.1. (18139)

"Superstet" water softeners, makers of? T.E.—F. C. and F. W. Timpson, 74 York St., Glasgow C.2. (18143)

"Nicol" fires, makers of? T.E.—Nico Light Co., Ltd., 1 Laud St., Croydon. (18169)

"Autoclima" hospital apparatus, makers of? T.E.—Stewart King Industries Ltd., 4 New Bridge St., London E.C.4. (18152)

"EIC" instruments, makers of? T.E.—Electrical Instrument Co. (Hillington) Ltd., Boswell Sq., Hillington, Glasgow S.W.2. (18158)

Adaptors for coupling flexible steel tube to conduit, makers of? G.S.—Fitter and Poulton Ltd., Vincent Parade, Birmingham 12; Turner Mfg. Co., Ltd., Wulfruna Works, Moorfield Rd., Upper Villiers St. Wolverhampton. (18163)

"F.T." floor cleaner, makers of? T.E.—Fraser-Tuson Ltd., 102 Croydon Rd., Beckenham. (18147)

The above are selected from questions we have answered this week. If you have a query, send it to us.

June 27.—Wellington. Four 3-phase 50 kV 500 MVA circuit-breakers and accessories for Tauranga substation. Deposit £100; bond £275. Secretary, Tenders Committee, State H.E. Dept., Wellington, New Zealand.

June 30.—Melbourne. Four electric motor driven pumping units for Red Cliffs pumping station. Chief Mechanical Engineer, 31 Flinders Lane, Melbourne.

July 5.—Queensland. Control equipment for circulating water systems at Howard and Townsville power stations. State Electricity Commission, Queensland. B.o.T. (Ref. CRE (IB) 52102/50).*

July 10.—Johannesburg. Steam raising plant, coal conveyor, boiler feed pump, 2,000 kW turbo-alternator spray cooling equipment, 10-ton hand operated travelling crane, 11 kV switchgear, voltage regulator, h.t. and l.t. cable and alkaline battery driven electric tractor for municipal power station, Grahamstown. Town Clerk, Grahamstown.

July 12.—Sydney. 4,000 kW rectifier units and energy dissipating resistor units for 1,500 V railway traction. Chief Electrical Engineer, Railways, 19 York Street, Sydney.

July 14.—Manila. One hydraulic turbine and governor; and/or one generator, switchgear and station service equipment, supervisory control equipment, power transformer, substation equipment and line materials, for Talomo River No. 2A Hydro-electric Project. Office of the National Power Corporation, 4th Floor, Natividad Building, Escolta, Manila.

July 27.—Dunedin. Two 50-ton electric overhead travelling cranes for the No. 3 and 4 stations at Walpori. City Electrical Engineer, Cumberland St., Dunedin C.1, New Zealand.

Aug. 1.—Wellington. Six single phase double-wound transformer units each 5,500 kVA 11/63·5 kV 50 cycle outdoor type oil immersed and water cooled for Waitaki power station, State H.E. Dept., Wellington. B.o.T. (Ref. CRE (IB) 51227/50).*

Aug. 3.—Western Australia. Pumps, motors and electrical gear for two pumping stations on the Wellington Dam to Narrogin pipeline. Agent General for Western Australia, Savoy House, 115-116 Strand, W.C.2.

Aug. 16.—Queensland. One turbo-alternator, 2,500 kW, 6,600 V and accessories for Hume St. power station, Mackay City Council. State Electricity Commission, Queensland. B.o.T. (Ref. CRE (IB) 52402/50).*

Sept. 28.—Buenos Aires. Electro-mechanical plant for "Colonia Sarmiento" h.e. power station in the military zone, Comodore Rivadavia. Argentine Ministry of Industry and Commerce. Ref. No. 153/50. Direccion de Talleres y Suministros, Calle Lavalle 1556, Buenos Aires.

Sept. 28.—Queensland. Manufacture, supply, erection, testing, putting into service and maintenance, at the Bulimba "B" power station of two steam boilers and accessories, and automatic control. Manager, City Electric Light Co. Ltd., Boundary Street, Brisbane. B.o.T. (Ref. CRE (IB) 51002/50).*

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	162 0 0	£156 0 0
Delivered in 2nd and 3rd month after order ...	163 10 0	—
Delivered in 4th, 5th and 6th month after order	165 0 0	—
LEAD, good soft pig (foreign)	96 0 0	96 0 0
" " " " "English" quality	97 10 0	—
Delivered in 2nd and 3rd month after order, plus	1 0 0	—
TIN (99·99·75%) ... ... (Cash)	595½-596½	—
" (3 months)	596½-597½	—
ALUMINIUM, commercial purity (del.) ...	112 0 0	—
ZINC	103 10 0	96 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.)	41 0 0	—
Mild Steel Tape (0.04 in.)	26 0 0	—

CONTRACTS PLACED

Hull T.C. Electrical installations: 30 flats at Priory Rd. West, Booker and Tarran Ltd., £1,190; 30 flats in Bellfield Avenue, W. Marlow, £1,017; 118 houses on Bilton Grange estate, W. Marlow, £4,027; 96 and 94 houses on Bilton Grange estate, Humber Electrical Engineering Co. Ltd., £3,300 and £3,237 respectively; 54 flats in Bricknell Avenue, Reliance Electric Co., £2,008.

Middlesbrough E.C. Installation of electric lighting and power at education offices. Tees Electrical Installations, £1,265.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller

Artindustria. B684,803. Class 9. Cinematograph projection apparatus, etc. G. J. Levy, Sunya House, Cumberland Park, London N.W.10.

Ega. 683,910. Class 9. Starter switchgear for electric motors. Ega Electric Ltd., Holyhead Rd., Wednesbury, Staffs.

Elliotronic. 685,686. **Elliottron.** 685,687. **Elliotron.** 685,688. **Elliottrol.** 685,689. **Elliotrol.** 685,690. **Eliottrolic.** 685,691. **Elliotrolic.** 685,692. **Elliotmatic.** 685,693. **Elliomatic.** 685,694. Class 9. Electrical apparatus and instruments, etc. Elliott Bros. (London) Ltd., Century Works, Lewisham, S.E.13.

Limit. 683,353. Class 11. Installations for lighting, heating, cooking, refrigerating, drying and ventilating. Limit Eng. Co. Ltd., 15/29 Windsor St., Essex Rd., Islington, London N.1.

Moldseal. 686,521. Class 9. Electric capacitors (condensers). A. H. Hunt Ltd., Bendon Valley, Garratt Lane, London S.W.18.

PSC (with design).—681,570. Class 11. Refrigerating machines. Pressed Steel Co., Ltd., Cowley, Oxford.

Spiraluxe. 677,005. Class 11. Appliances for heating air, and combined heating and ventilating appliances. Spiral Tube and Components Co., Ltd., Honeypot Lane, Stanmore, Middlesex.

Wilson Electric, The. 674,542. Class 12. Electrically propelled road vehicles. Partridge Wilson and Co. Ltd., Davenset Electrical Works, Evington Valley Rd., Leicester.

BUSINESS PROSPECTS

Ayr T.C. A report is to be obtained from the Lighting Superintendent for improvement of the lighting of the Town Hall.

Bakewell R.D.C. Erection of 10 houses in Eyam. A. Lowcock, Architect, King Street, Bakewell.

Burnham - on - Crouch U.D.C. Erection of 9 dwellings at Orchard Road estate. S. Bragg, Architect, 16 London Road, Chelmsford.

Carlisle T.C. Erection of a junior and infants' school for 360 pupils, Belah. City Engineer, 18 Fisher Street, Carlisle.

Chesterfield T.C. Erection of 80 houses on Newbold estate. Borough Engineer and Surveyor, Town Hall, Chesterfield.

Darlington E.C. Approved plans for proposed new high school for girls at Hummersknott at £255,000. E. A. Tornbohm, Borough Architect, Central Buildings, Darlington.

Dartford T.C. Erection of 76 dwellings at Temple Hill estate. Borough Surveyor, Barclay's Bank Chambers, High Street, Dartford.

Edeyrnion R.D.C. Construction of 15 houses with shop and flat at Caeffynnon Field, Pen-y-bryn, Corwen, and 2 houses at site on Llandrillo Road. Clerk, Council Offices, Corwen.

Featherstone U.D.C. Erection of 44 houses on Little Lane (No. 2) housing site. H. Tattersall, Clerk to the Council, Council Offices, Featherstone.

Haslingden T.C. Erection of 58 houses on Rising Bridge estate. J. Mason, Borough Engineer and Surveyor, Municipal Offices, Bury Road, Haslingden, Rossendale.

Holderness R.D.C. Erection of 32 houses at Bilton. A. Tillotson, Council Offices, Skirlaugh.

Lindsey C.C. Prepared to receive tenders from selected firms for installation and provision on rental basis of an internal telephone system in (*a*) three departments of the County Offices, or (*b*) the County Office buildings as a whole. Firms desiring to tender to submit names by May 20. County Architect, A. R. Clark, County Offices, Lincoln.

Longbenton U.D.C. Plans prepared for 46 two-bedroomed houses and 30 three-bedroomed houses, Crossley Terrace, Forest Hall. A. E. Sweetman, Surveyor.

Middlesbrough. Garbutt, Archibald and Archibald, Albert Road, Middlesbrough, are architects for proposed alterations to the Grange Working Men's Club, Grange Road, Middlesbrough; and 16 pairs of houses in Malvern Drive and Holbeck Avenue for T. Duncanson and Sons Ltd., and petrol filling station for Appleby and Dowling. T. Phillips, Son and Co. Ltd., are to build a petrol filling station in North Road to plans by Kitching and Co., 21 Albert Road, Middlesbrough. The Stanton Ironworks are to build steaming chamber, washrooms and office at Cochrane Foundry, Cargo Fleet. Plans for the second development of the Berwick Hills housing scheme, including 500 new houses, have been prepared by the Borough Engineer (J. A. Kenyon). Plans have also been approved for 30 houses in Glendale Road and Easby Avenue.

Middlesbrough T.C. Erection of 68 houses at Saltersgill. J. A. Kenyon, Borough Engineer, Municipal Buildings, Middlesbrough.

Newcastle-on-Tyne. Proposed pathological institute and regional blood transfusion centre at General Hospital, for regional Hospital Board. Estimated cost, £180,000. Architects, Scherres and Hicks, Harcourt House, Cavendish Square, W.1.

Norwich T.C. Erection of 2 groups of houses (54 dwellings) at Cooper Lane estate. City Architect's Office, City Hall, Norwich.

Oxfordshire C.C. Erection of county modern secondary schools at Banbury and Bicester. G. R. Hutton, County Architect, 3 Becket Street, Oxford.

Peterborough T.C. Erection of 24 houses on Eastfield estate. F. J. Smith, City Engineer and Surveyor, Town Hall, Peterborough.

Reading Education Committee. Approved proposals for the installation of electricity in Norcot school. Borough Architect to prepare specifications and invite tenders.

OVERSEAS

Belgian Congo. Union Miniere du Haut Katanga, 6 Montagne du Parc, Bruxelles, wish to receive catalogues from U.K. manufacturers of all equipment, tools and machinery needed for mining and electric installations.

Italy. Ministry of Public Works, Rome, would like to receive offers from U.K. manufacturers and consultants specialising in airport equipment and development. The Ministry is especially interested in radio and lighting equipment. Address: Ministerio Labori Pubblici, Via Nomentana, Rome.

TRADE NOTES

Acquisition.—The General Electric Co. Ltd. has acquired the system of picture telegraphy previously made and sold by the Unit Telephoto Co. Ltd. of Glasgow. Production has already started at the company's telephone works at Coventry.

African Subsidiary.—Aiton Africa (Pty.) has been formed to manufacture power station pipework in South Africa.

Metal Prices.—As from May 10, the price of zinc was raised by £4 to £103 10s. a ton. The price of good soft pig lead was increased by £2 to £92 a ton as from May 11, and by a further £4 to £96 a ton delivered, as from May 12.

Scrap Prices.—The controlled maximum delivered prices of iron and steel scrap has been raised as from May 15, as the result of increased rail and road transport costs. Maximum prices for pig-iron, cast-iron pipes and fittings, wire and wire products, and rainwater and soil goods will be raised in consequence of higher transport costs and galvanised sheets as a result of recent increases in the cost of zinc.

Makers' prices of heavy steel and of other steel products subject to price control remain unchanged.

The Ministry of Supply also announces that chrome ore prices will be raised for despatches effected on and after May 15.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Auto Electrical Service Co. (Reading) Ltd.—Dealers in batteries, 24 King's Road, Reading. Mr. A. W. Hunter, 185-188 High Holborn, W.C.1, appointed liquidator at creditors' meeting on Apr. 19.

Ben Sless (Tools) Ltd.—Resolution for voluntary winding up passed at meeting on April 17. Mr. M. B. Hewitt, Martins Bank Chambers, Park Row, Leeds, appointed liquidator.

W. Hampton (Stafford) Ltd., electrical contractors, 1 Bridge St., Stafford. R. E. Clark, 17 Albion St., Hanley, Stoke-on-Trent, appointed liquidator at members' and creditors' meeting on May 8.

Harold John August Wade and Clara Louise Wade, carrying on business as C. and H. Wade and Co., 40 Dulwich Road, Herne Hill, London, S.E.24, lately at 68 Brixton Water Lane, Brixton, London, S.W.2, electrical engineers and contractors. First meeting of creditors was held recently at London Bankruptcy Buildings, Carey Street, W.C.2, when the matter was left in the hands of the Official Receiver as trustee of the estate.

Magneto Repairs (Leeds) Ltd.—Electrical engineers, Hope Road, Regent Street, Leeds 9. Mr. J. A. Hartley appointed liquidator at meeting on Apr. 19.

Miles Refrigeration Ltd.—Pursuant to Section 293 of the 1948 Companies Act, a meeting of creditors will be held at the offices of Arthur Southon and Co., 13 Finchley Lane, Hendon, N.W.4, on May 16 at 2.30 p.m.

Peerless Radio, Ltd.—In the Companies Court on May 8, Justice Wynn-Parry had before him a petition for the compulsory winding up of Peerless Radio Ltd. A compulsory order for the winding up of the Company was granted.

Spencer Coates and Co. Ltd., manufacturers of electrical apparatus, Bush Lane House, Cannon St., E.C.1. Mr. N. W. Osborne, 11-12 Finsbury Square, E.C.2, appointed liquidator on April 25 with committee of inspection.

West Bromwich.—Petition for winding-up of the Element Manufacturing Co. (Birmingham) Ltd. heard on Apr. 21. Petition directors to be heard by the court at 11 a.m. on May 31. Creditors or contributories can obtain particulars from Fowden, Newton and Varney, 2 St. Peter's Square, Manchester 2.

BANKRUPCTCY ACTS

Dividends

Brighton and Lewes.—R. S. Warrell trading as "R. S. Warrell and Son," 2 Norfolk Rd., Littlehampton, electrician. Second and final payment, 1¾d. per £1. Payable on May 23 at the office of A. E. Orbell, 6 and 7 Old Steine, Brighton.

Intended Dividends

Ashton-under-Lyme and Stalybridge.—E. B. Page, electrical engineer, residing at 3 Peel St., Hyde, and carrying on business at 10 and 12 John St., Hyde. Last day for receiving proofs, May 26. Trustee, F. C. Ormrod, 20 Byron St., Manchester 3.

Partnerships Dissolved

Bedfordshire Electrical Installation Co.—Charles William Harper and John Melvin James Bedford, carrying on business as electrical engineers at 13 St. Paul's Rd., Bedford, under the style or firm of "Bedfordshire Electrical Installation Co." Partnership dissolved as from March 1. Debts will be paid by C. W. Harper, who will carry on the business.

Gaish and Burge.—Edward Henry Gaish, Richard John Burge and George Andrew Smith, electrical contractors of 2 Bank Buildings, Cranleigh, Surrey, under the style or form of "Gaish and Burge." Partnership dissolved as from March 31. Debts will be paid in full by E. H. Gaish and R. J. Burge, who are carrying on business.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Broxlea Products Ltd., Park Lane Corner, High Rd., Broxbourne, Herts. To take over business of electric and electronic apparatus assembly carried on at Broxbourne, Herts, as "Broxlea Products." Cap.: £5,000. Dirs.: A. T. Izzard, L. D. H. Izzard and B. G. Izzard.

Duncan-Pope (Wallington) Ltd., 9 Cavendish Square, W.1 Electric lamp bulb manufacturers, electrical, mechanical and general engineers, etc. Cap.: £2,000. Dirs.: L. D. Pope and Elizabeth W. Pope.

E. A. Porritt (Electrical) Ltd., 13 Westdale Rd., Forest Hill, S.E.23. Manufacturers of and dealers in wireless and television sets and accessories, etc. Cap.: £2,000. Dirs.: E. A. Porritt and W. Mitchell.

William Hucks and Co. Ltd., 36 Jamestown Rd., N.W.1. Electrical and general engineers, etc. Cap.: £100. Dirs.: H. C. Hucks, J. G. Grinling and F. W. McGuinness. Subs.: W. and A. Gilbey Ltd., and T. Foster and Co. (Wines and Spirits), Ltd.

Elkrom Electrical Development Ltd., 87a Gertrude Rd., West Bridgford. To take over business carried on as "Elkrom Electrical Development" at West Bridgford. Cap.: £6,000. Dirs.: Mrs. N. M. Craig, Miss I. A. Craig and K. B. McCabe.

MEETINGS TO NOTE

THURSDAY, MAY 18

I.E.E.—Commemoration of the Centenary of the birth of Oliver Heaviside. 3 p.m.—"Heaviside the Man," Sir George Lee. 5 p.m.—"An Appreciation of Heaviside's Contribution to Electromagnetic Theory," Prof. W. Jackson. "Heaviside's Operational Calculus," Prof. G. van der Pol. Institution, Savoy Place, W.C.2.

FRIDAY, MAY 19

INSTITUTION OF ELECTRONICS.—"Television Camera Tubes." G. B. F. Goff. Royal Society of Arts Hall, John Adam Street, Adelphi, W.C.2.—7 p.m.

WEDNESDAY, MAY 24

I.E.E. (Supply section).—Conversazione. Institution, Savoy Place, W.C.2.—5.30 p.m.

THURSDAY, MAY 25

I.E.E. (annual general meeting).—Institution, Savoy Place, W.C.2.—5.30 p.m.

59,700 kVA.

of **HACKBRIDGE** TRANSFORMERS

Photo: Aero Pictorial Ltd.

for

CLIFF QUAY POWER STATION

ALL the auxiliary transformers for Cliff Quay Power Station are HACKBRIDGE. They comprise thirty-four units ranging from 7,500 kVA. down to 150 kVA. with a total capacity of 59,700 kVA.

Hackbridge transformers for auxiliary supply, as well as main generator units up to the largest capacities, have been selected for many of Britain's new Power Stations, also for many important generating stations and main substations in overseas countries. Their supreme reliability is based upon nearly 30 years experience in the design and manufacture of transformers of every kind for duty under the widest range of service conditions.

The Walton-on-Thames Works of Hackbridge and Hewittic Electric Co. Ltd.

HACKBRIDGE AND HEWITTIC ELECTRIC CO. LTD., WALTON-ON-THAMES, SURREY

Telephone: Walton-on-Thames 760 (8 lines) Telegrams: "Electric," Walton-on-Thames

All the newest technical improvements available to contractors will make this new estate a worthy contribution to the housing problem. It will make big demands on electrical services for its many domestic needs. So, METALLIC conduits will assuredly be specified—chosen for its unfailing reliability, meticulous accuracy and simplicity of assembly. METALLIC is processed from laboratory-tested flawless metal—

The SAFE conduit for SAFE conduct

METALLIC

CONDUIT TUBE AND FITTINGS

A TI COMPANY

THE METALLIC SEAMLESS TUBE CO. LTD.
LUDGATE HILL, BIRMINGHAM. TEL: CEN 7167.
Also at London Newcastle-on-Tyne, Leeds Swansea and Glasgow.

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

BOROUGH OF ASHTON-UNDER-LYNE

Crowhill Scheme No. 4

ELECTRICAL WIRING TO 96 HOUSES

TENDERS are invited from electrical contractors for the complete Wiring Installation to 96 Houses to be erected on the Crowhill Estate (Housing Site No. 4), Ashton-under-Lyne.

The general conditions of contract, specification, and form of tender can be obtained on application to Mr. A. T. Kemp, M.I.Mun.E., Borough Engineer and Surveyor, Municipal Offices, Ashton-under-Lyne, on payment of ten shillings, to be refunded upon receipt of a bona fide tender and the return of all documents.

Tenders must be submitted in a plain sealed envelope endorsed "Tender for Electrical Work, 96 Houses," and delivered to the undersigned not later than noon, Wednesday, May 31, 1950.

The Council do not bind themselves to accept the lowest or any tender.

G. A. MALONE,
Town Clerk.

Town Hall, Ashton-under-Lyne.
May 9, 1950. (E 636)

COUNTY BOROUGH OF HALIFAX EDUCATION COMMITTEE

Schools Swimming Centre - Park Road Baths

ELECTRICAL WORK

TENDERS are invited for the electrical work at the above.

Plans may be seen and the specification, quantities, and form of tender obtained at the office of the Borough Engineer, Crossley Street, Halifax, on payment of a deposit of three guineas (cheques to be made payable to "Halifax Corporation"), which will be returned after the receipt of a bona fide tender.

Tenders, endorsed "Electrical Work—Park Road Baths," are to be delivered to the undersigned not later than 10 a.m., Wednesday, May 31, 1950.

The contractor whose tender is accepted will be required to observe the fair contract clauses adopted by the Corporation.

The Committee does not bind itself to accept the lowest or any tender.

RICHARD DE Z. HALL,
Town Clerk.

Town Hall, Halifax.
May 11, 1950. (E 657)

APPOINTMENTS VACANT

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for positions of a CLASS I JOINTER and a CLASS II JOINTER at Carmarthen in the Western Sub-Area of the Board.

Applicants for the position of Class I Jointer should be qualified to joint and connect all classes of cable, and for the position of Class II Jointer should be qualified to joint and connect all low- and medium-voltage cables.

The wages will be in accordance with the agreement of the National Joint Industrial Council for the Electricity Supply Industry, which is 2s. 11d. per hour for Class I jointer and 2s. 10d. per hour for a Class II jointer.

Applications, stating age, present position, experience, and whether married or single, should be addressed to the Sub-Area Manager, The South Wales Electricity Board, South Beach Pavilion, Tenby, so as to reach him not later than May 31, 1950. (E 655)

SINGAPORE MUNICIPALITY

Electricity Department

CHARGE ENGINEERS, permanent staff, required for shift duties in the Singapore Power Station. Present capacity, 37,000 kWs., with proposed extensions to 87,000 kWs.

Experience of extra h.t. 3-phase generation in a modern high-pressure steam power station is essential. Appointment subject to medical examination.

Basic salary scale, $440-$870 per month. Starting point according to qualifications and experience. Graduated scale of allowances, e.g., present allowances on $500 p.m. basic salary amount to: Expatriation, $110 p.m., plus cost of living, $180 p.m. for single man or $225 p.m. for married man, or $285 p.m. for married man with family. Annual increments $30 per month. Local taxation much lower than England. One Straits dollar equals 2s. 4d. Thus a married man with family on basic salary of $500 would draw equivalent of £1,252 sterling per annum.

Quarters, with heavy furniture provided at 8 per cent. of salary or housing allowance of 12 per cent. in lieu. Initial engagement on three years' agreement; eight months' leave after four years' service. Free medical attention. Passages paid, including family. Compulsory Provident Fund contribution, 7½ per cent. of salary and Municipal Commissioners donate 7½ per cent. for first 10 years, increasing later.

Applications in duplicate, with full personal and technical information and copies of three testimonials, to Messrs. Peirce and Williams (Agents to the Municipal Commissioners), 1 Victoria Street, London S.W.1. (E 642)

BRITISH ELECTRICITY AUTHORITY

London Division

CHARGE ENGINEER—BOW GENERATING STATION

APPLICATIONS are invited for the position of Charge Engineer at Bow Generating Station.

The salary is in accordance with the revised N.J.B. Schedule, Grade 7, Class "F," £656 5s., inclusive of the London allowance.

Applicants should have good technical qualifications and sound operating experience of medium pressure water tube boilers and steam turbines, also l.t. and e.h.t. switchgear up to 22 kV.

Applications, giving full particulars of age, technical training, and experience, should be forwarded to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, to be received within 14 days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller.
(E 634)

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

APPLICATIONS are invited for the appointment of ASSISTANT SHIFT CHARGE ENGINEER at the Clarence Dock Power Station, Liverpool.

The commencing salary will be in accordance with Class "K" Grade 9, of the National Joint Board Schedule, i.e., £687-£715 per annum.

Applicants should have had a good general education and experience in the shift operation of generating plant. The possession of a Higher National Certificate or equivalent qualification would be an advantage.

The appointment will be superannuable under the British Electricity Authority and Area Board's Superannuation Scheme and is subject to a medical examination.

Application forms may be obtained from the Divisional Secretary, British Electricity Authority, Merseyside and North Wales Division, Clarke Gardens, Woolton, Liverpool; the completed form should be returned to him not later than Tuesday, May 30, 1950. (E 635)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following positions in the Generation Construction Department at Divisional Headquarters in North London:—

(a) GRADE 1 DRAUGHTSMAN (ELECTRICAL)

The commencing salary will be within the range of £494-£600 per annum, plus 5 per cent. London weighting, depending upon experience and qualifications.

(b) GRADE 2 DRAUGHTSMAN (ELECTRICAL)

The commencing salary will be within the range of £347-£461 per annum, plus 5 per cent. London weighting, depending upon experience and qualifications.

Applicants for position (a) should possess the Higher National Certificate, and for position (b) the Ordinary National Certificate in Electrical Engineering and have a knowledge of the layout of electrical power plant, e.h.t. sub-stations, and the preparation of transmission and works power systems.

The salaries are provisional and will be subject to negotiation through the medium of the appropriate negotiating body.

The appointments will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience, and present position, should be sent in envelopes endorsed with the appointment sought, to arrive not later than June 2, 1950, to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14.

W. N. C. CLINCH,
Controller.

Northmet House, Southgate, N.14. (E 645)

HIS MAJESTY'S COLONIAL SERVICE

VACANCIES exist for ELECTRICAL ENGINEERS in the Electrical Department, Gold Coast Colony.

The appointment is either on contract or permanent and pensionable. If on contract the salary would be in the scale £894 to £1,500 per annum. If permanent and pensionable, the salary scale would be £720 to £1,300 per annum, point of entry in each case depending on age, qualifications, experience and war service. For contract appointments a gratuity of £25 for every three months of service is payable at the termination of the service. In addition to the above, a non-pensionable cost-of-living allowance of £114 to £221 per annum is payable, the amount being dependent on the salary.

Candidates must be corporate members of the Institution of Electrical Engineers or hold equivalent qualifications, or have passed Sections "A" and "B" of the Institution examinations, and should have served an electrical engineering apprenticeship and have a thorough knowledge of generation and distribution. Experience in construction and installation of overhead lines, underground cable network and outdoor and indoor sub-stations, voltage up to 11 kV, and knowledge of radio telephony would be an advantage. The officers selected would be required to take charge of electricity undertakings in the Colony.

Partly furnished quarters at rents of £60 to £90 per annum, and free first-class passages are provided each way each tour for the officer and his wife, if married, and children up to three in number under the age of nine years. Home leave on full pay at the end of each tour of eighteen months at the rate of seven days for each month of resident service. Income tax at local rates.

Intending candidates should write for further particulars and application form to the Director of Recruitment, Sanctuary Buildings, Great Smith Street, S.W.1 giving brief details of age, qualifications and experience, as soon as possible, quoting the Reference No. 27326/16.

(E 621)

LONDON ELECTRICITY BOARD

ENGINEER (CONSTRUCTION)

APPLICATIONS are invited for the following appointment in the Construction Branch of the Chief Engineer's Department in Central London:

Engineer (Construction) to supervise erection of various bulk supply sub-station sites within the Board's area, of heavy electrical plant, including transformers and switchgear, at working pressures of up to 66 kV, together with all auxiliary equipment and rotary converting plant. Applicants must have had previous experience of this work, both in the factory and in the field. Corporate membership of the Institution of Electrical Engineers and/or Institution of Mechanical Engineers would be an advantage.

The commencing salary will be from £750 per annum, dependent on qualifications and experience. This salary is provisional pending grading of the post under the revised agreement of the National Joint Board.

Application forms, obtainable from Establishments Officer, 46/47 New Broad Street, E.C.2, on receipt of an addressed foolscap envelope, should be returned duly completed not later than May 27, 1950. Please mark envelope EST/V/778/T. (E 599)

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

GENERAL ASSISTANT ENGINEER

APPLICATIONS are invited for the position of General Assistant Engineer in the System Operation Department at Divisional Headquarters, Leeds.

The duties are of a general technical nature in connection with system operation and control. Applicants should have a good general and technical education and preference will be given to candidates who are graduates of the I.E.E. or hold equivalent qualifications. Experience in a generating station will be an advantage.

Conditions of service will be in accordance with the N.J.B. Agreement, the salary range being in accordance with Schedule C, Grade 8, £437-£622 per annum.

The appointment will be subject to the provisions of the Authority's Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Yorkshire Division, British Electricity House, Leeds 7, to whom completed forms must be returned within 14 days of the appearance of this advertisement. Envelopes to be endorsed in the top left-hand corner, "General Assistant Engineer (System Operation)."

G. A. VOWLES,
Divisional Controller.
(E 639)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following vacancies in the System Operation Department:—

(i) FIRST ASSISTANT CONTROL ENGINEER
(ii) GENERAL ASSISTANT ENGINEERS

Applicants should have had practical training and have technical qualifications up to Graduate I.E.E. standard.

The commencing basic salary for (i) will be within the range £579, rising to £710, and for (ii) £437 rising to £569. To both will be added a London allowance of 5 per cent. with a minimum of £25 per annum. These salaries are in accordance with Class "AX." Grades 5 and 8 respectively of the N.J.B. Schedule, and are subject to an ultimate maximum in Class "EX" for (i) of £799 and for (ii) of £641, plus 5 per cent. London allowance in each case.

Applications for the foregoing vacancies should be made on forms which may be obtained from the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, and be returned not later than 14 days after the appearance of this advertisement.

All applications received in respect of previous advertisement in March, 1950, will receive consideration and re-application is not required.

J. N. WAITE,
Divisional Controller.
(E 643)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

VACANCY No. 1/50

APPLICATIONS are invited for the appointments of JUNIOR ENGINEERS at various generating stations in this Division.

The salary will be in accordance with the National Joint Board revised agreement—£375 for the first year, rising to a maximum figure which varies with the station's classification.

Applicants should have received a full apprenticeship in a manufacturing works, and the possession of the H.N.C. would be an advantage.

The appointment will be superannuable under the British Electricity Authority and Area Boards scheme.

Forms of application may be obtained from the Divisional Secretary at the address below, to whom completed applications should be returned not later than May 29, 1950, in sealed envelope endorsed "Junior Engineers."

H. V. PUGH,
Divisional Controller.

Cardiff (Pengam Moors) Airport, Cardiff.
May 13, 1950. (E 662)

SOUTH EASTERN ELECTRICITY BOARD

East Sussex and S.W. Kent Sub-Area, Eastbourne

SENIOR ASSISTANT (INCOME)

COMMENCING salary of £570 per annum. Superannuation will be arranged. Applicants should have a thorough knowledge and experience of accounting and control of consumers' billing and other income on a large scale. Accountancy qualifications and experience of mechanical income accounts would be additional advantages.

Applications, giving two referees, must reach N. Boydell, Esq., M.I.E.E., A.M.I.Mech.E., East Sussex and S.W. Kent Manager, South Eastern Electricity Board, Electric House, Grove Road, Eastbourne, by May 31, 1950.

A. L. BURNELL,
Secretary.

May, 1950. (E 659)

HIS MAJESTY'S COLONIAL SERVICE

A VACANCY exists for the post of MASTER, Posts and Telegraphs Technical School, Gold Coast Colony.

The appointment is either on contract or permanent and pensionable. If on contract the salary would be in the scale £900 to £1,450 per annum. If permanent and pensionable £660 to £1,300 per annum. Point of entry in each case depending on age, qualifications, experience and approved war service. In addition to the above, a cost-of-living allowance of £102 to £217 per annum is payable, depending on the salary.

Candidates must have an engineering degree or be corporate members of the Institution of Electrical Engineers or exemption from Sections "A" and "B" of the Institution examinations, should have experience of modern telecommunication equipment including teleprinters, manual and automatic exchanges, carrier and wireless systems, and should be able to impart practical and theoretical instruction in this equipment to subordinate staff. They will be required to assist the Principal of the Technical Training School for departmental employees.

Partly furnished quarters at rentals of £60 to £90 per annum. Free first-class passages each way each tour for the officer and his wife are provided. Passages for children up to three in number under the age of nine years are also provided. Home leave on full pay at the end of each tour of eighteen months at the rate of seven days for each month of resident service. Income tax at local rates.

Intending candidates should write for further particulars and application forms to the Director of Recruitment, Sanctuary Buildings, Great Smith Street, London S.W.1, giving brief details of age, qualifications and experience, as soon as possible, quoting Reference No. 27323/22. (E 622)

SOUTH EASTERN ELECTRICITY BOARD

Surrey Sub-Area Headquarters - Dorking

DRAUGHTSMAN

PROVISIONAL salary, £390 per annum. Superannuation will be arranged. Applicants should preferably have been employed in the distribution department drawing office of an electricity supply undertaking. They should have experience in the preparation of sub-station layout drawings, switchgear layouts, electrical network diagrams, and the recording of cables and lines on ordnance sheets.

Applications, giving two referees, must reach C. W. Hughes, Esq., B.Sc., M.I.E.E., Surrey Manager, South Eastern Electricity Board, "Rough Rew," Horsham Road, Dorking, Surrey, by May 29, 1950.

A. L. BURNELL,
Secretary.

May, 1950. (E 658)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of FOREMAN LINESMAN at Aberayron, Cardiganshire, in the Western Sub-Area of the Board.

A knowledge of ht/lt pole line construction is essential, with special reference to rural areas. The successful applicant will be required to undertake switching operations, under supervision, within the area in which he is employed.

The wage will be in accordance with the agreement of the National Joint Industrial Council for the Electricity Supply Industry, the rate at present being 3s. 2d. per hour for a 44-hour week.

Applications, stating age, present position, experience, whether married or single, together with the names and addresses of three referees, should be addressed to the Sub-Area Manager, The South Wales Electricity Board, South Beach Pavilion, Tenby, so as to reach him not later than May 31, 1950. (E 656)

GOVERNMENT OF IRAQ

MECHANICAL AND ELECTRICAL ENGINEER required by the Directorate General of Municipalities, Iraq, for a tour of two years in first instance. Salary of not less than I.D.150 a month, plus cost of living allowance of between I.D.10 and I.D.14 a month, according to dependants. (I.D.1 equals £1.) The post is non-pensionable but there is a provident fund. Free passages. Candidates must be Corporate Members of the Institution of Mechanical Engineers and the Institution of Electrical Engineers, or possess one of these qualifications and have a sound technical knowledge and suitable experience in both electrical and mechanical engineering. They must be capable of undertaking the design of a.c. and d.c. public lighting systems and be fully acquainted with the installation, maintenance and operation of diesel electric generating plants and electrically driven pumping units, and the layout and construction of h.t. and l.t. overhead lines.—Apply at once by letter, stating age, whether married or single and full particulars of qualifications and experience and mentioning this paper to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting M/N 24694(3B) on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (E 582)

HIS MAJESTY'S COLONIAL SERVICE

A VACANCY exists for an ELECTRICAL ENGINEER in the Public Utilities Department, Gambia Colony. Salary within the scale £720 to £1,300 per annum, point of entry depending on age, qualifications and experience.

Candidates must be corporate members of the Institution of Electrical Engineers or hold equivalent qualifications, or should have passed Sections "A" and "B" of the Institution examination, and should have served an electrical engineering apprenticeship and have a thorough knowledge of generation and distribution. Experience in construction and installation of overhead lines, underground cable network and outdoor and indoor substations, voltage up to 11 kV, and knowledge of radio telephony, would be an advantage. The officers selected would be required to take charge of electricity undertakings in the Colony.

Partly furnished quarters at low rentals, and free first-class passages each way each tour for the officer and his wife, if married, are provided. Home leave on full pay at the end of each tour of 18 months at the rate of 7 days for each month of resident service. Income tax at local rate.

Intending candidates should write for application forms to the Director of Recruitment, Sanctuary Buildings, Great Smith Street, S.W.1, giving brief details of age, qualifications and experience, as soon as possible, quoting the Reference Number 27326/26. (E 623)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointment:—

No. 5 (Wakefield) Sub-Area

DISTRICT ENGINEER (BARNSLEY DISTRICT)
Vacancy No. 24/50

Candidates must have had a sound practical training and considerable experience in the operation, maintenance and planning of high and low voltage overhead and underground networks, in substations, the supervision of construction work, and in modern methods of compiling accurate records of distribution and substation plant alterations and layouts.

Preference will be given to candidates who are Corporate Members of the Institution of Electrical Engineers.

The successful candidate will be responsible for the general maintenance of supply in the district.

Salary: N.J.B. Schedule Class "F," Grade 3, £827-£985 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Road, Wakefield, within 14 days of the appearance of this advertisement. (E 584)

MIDLAND ELECTRICITY BOARD

South Staffordshire & North Worcestershire Sub-Area

APPOINTMENT OF FIRST ASSISTANT DISTRICT ENGINEER

APPLICATIONS are invited for the above position in the Dudley District.

Applicants must have had experience in all branches of distribution work, including operation and maintenance of high- and low-voltage cables, overhead lines, substations, etc. The appropriate technical qualifications will be considered an advantage.

The conditions of service will be in accordance with the National Joint Board Agreement and the provisional salary, Class "D," Grade 6, £594-£616 per annum.

Applications, stating age, present salary, qualifications, experience, and present position, should be forwarded within 14 days to Mr. T. G. Keeler, Manager, South Staffs. and North Worcestershire Sub-Area, Midlands Electricity Board, Toll End Road, Tipton.

A. STEPHENS,
Secretary.
(E 648)

HONGKONG ELECTRIC COMPANY LIMITED

APPLICATIONS are invited for the position of MAINS ASSISTANT, salary Hong Kong $750 per month, must have experience of electrical distribution systems, including e.h.t. cable jointing.

First contract would be for three years, with prospects of future employment at an increased salary. Applicants should be about 25 years of age and preferably unmarried.

There is at present a high-cost-of-living allowance of Hongkong $600 per month (Hongkong $ equals 1s. 3d. approximately) in addition to above salary.

Free passage to and from Hongkong. Free quarters and medical attendance. Staff provident fund. Eight months' leave on full pay, with free passages, after five years' service, thereafter leave is given every four years on similar conditions.

Applications, stating age, if single, particulars of training and experience, enclosing copies of testimonials, should be sent in writing to the Representative of the Hongkong Electric Co., Ltd., 122 Leadenhall Street, London E.C.3. (E 630)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

APPOINTMENT OF METER ENGINEER

APPLICATIONS are invited for the appointment of Meter Engineer in the department of the Sub-Area Engineer, based on Legacy, near Wrexham.

The commencing salary will be at the rate of £500 per annum, which will be on a provisional basis and subject to any adjustment necessary to conform to the Agreement recently negotiated by the National Joint Board for the Electricity Supply Industry.

Applicants should possess the Higher National Certificate in Electrical Engineering or equivalent qualification and should have had practical experience in the use of electrical standardising apparatus and the checking of sub-standard equipment as installed in a Type "A" single-phase testing station, including the testing and calibration of all types of a.c. meters and instruments.

Experience in the administrative work of a meter testing station and in the supervision of meter testers and repairers will be an advantage.

The successful candidate may be required to undergo a medical examination and, if eligible, will be required to contribute to a superannuation scheme.

Applications should be made on a form obtainable from the Manager, No. 4 Sub-Area, Electricity House, Rhostyllen, near Wrexham, and should be returned to him so as to be received not later than June 1, 1950.

JAMES RANKIN,
Secretary.
(E 660)

BRITISH ELECTRICITY AUTHORITY

Southern Division

VACANCY NOTICE No. S/13.131

APPLICATIONS are invited for the position of STATION SUPERINTENDENT at Poole Generating Station, now under construction at Hamworthy, Dorset.

Candidates should have received a thorough technical and practical training, followed by wide experience in the operation and maintenance of generating station plant. The ability to control technical, operating and administrative staff is also essential.

The successful applicant will be expected to reside within a reasonable travelling distance of the station.

The terms and conditions of service will be those approved by the National Joint Board, and the appointment, which is superannuable and subject to a satisfactory medical examination, will carry the classification Class "H," Grade 1 (£1,144-£1,198 per annum).

Forms of application may be obtained from the undersigned and must be returned by June 2, 1950.

P. D. A. OLIVER,
Divisional Secretary.

British Electricity House,
High Street, Portsmouth.
May 13, 1950. (E 661)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

ASSISTANT SHIFT CHARGE ENGINEER, AVON

APPLICATIONS are invited for the position of Assistant Shift Charge Engineer at Avon Generating Station, Warwick.

Candidates should have had a sound general and technical education, and have experience in the operation of steam power stations.

The salary will be in accordance with the revised National Joint Board Schedule, Class "E," Grade 9. The appointment will be superannuable under terms and conditions of the British Electricity Authority's superannuation scheme.

Forms of application may be obtained from the Divisional Establishments Officer at the undermentioned address, and should be returned to him not later than June 5, 1950.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate, Nottingham. (E 663)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of ASSISTANT DISTRICT ENGINEER, District 342, based at Merthyr, in the central sub-area of the Board.

Preference will be given to applicants who possess an engineering degree of a British University, the Higher National Certificate or its equivalent, or have passed the Graduateship examination of the Institute of Electrical Engineers.

The salary for the position will be in accordance with Class "E," Grade 4 (£722/£737/£752) of the National Joint Board Schedule for the electricity supply industry.

Applications, stating age, present position, present salary, qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than May 27, 1950. (E 615)

NORTH EASTERN ELECTRICITY BOARD

Wear Sub-Area

VACANCY FOR DEMONSTRATOR OR ASSISTANT DEMONSTRATOR OR TRAINEE DEMONSTRATOR

A VACANCY exists for a Demonstrator or an Assistant Demonstrator or Trainee Demonstrator for South Shields Service Centre.

A Demonstrator should hold the certificate of a recognised domestic science training college and preferably the E.A.W. Housecraft Certificate or Diploma and should have some practical experience.

An Assistant Demonstrator should have some or all of the above qualifications.

A Trainee Demonstrator should be a woman without the above qualifications but with good domestic experience or should be a girl over 16 years of age, preferably with general education up to School Certificate standard and with an aptitude for domestic work, to whom some domestic science training would be given.

Training in the use of electrical appliances will be given to all grades.

Salaries and conditions will be in accordance with the National Joint Council Agreement for the Electricity Supply Industry.

Demonstrator.—Grade I, £310/£390 per annum. Annual increments of £20 up to £350; beyond £350, increments subject to Certificate of Competence.

Assistant Demonstrator.—Grade equivalent to shorthand typist, i.e., £135 to £335 per annum. Initial salary in accordance with age. Annual increments of £20 subject to Certificates of Progress.

Trainee Demonstrator.—General clerical grade, £108/£308 per annum. Initial salary according to age. Increments up to £248 per annum according to age. Increments above £248 per annum, subject to Certificates of Progress.

Applications, giving particulars of age, education, training and experience, and stating for which of the three grades application is being made, should be sent to The Manager, Wear Sub-Area, The North Eastern Electricity Board, Dunning Street, Sunderland, to arrive no later than June 1, 1950. (E 672)

ASSISTANT MANAGER required by James Scott and Co. (Electrical Engineers), Ltd., Edinburgh. Apprenticeship and subsequent experience with well-known electrical contracting firm essential. Must have experience in running of large contracts and handling of staff. Generous pension scheme. Really excellent opportunities for promotion.—Apply in confidence, stating age and experience, to A. Stuart Thomson, B.Sc., Auchraw of Mailer, Perth. (E 637)

BUYER. A vacancy has occurred for a television, radio and electrical buyership with James Howell and Co. Ltd., Cardiff. Applicants with departmental store experience preferred.—Apply in writing to the General Manager, Messrs. James Howell and Co. Ltd., Cardiff. (E 653)

CHIEF ESTIMATOR required by James Scott and Co. (Electrical Engineers), Ltd., Edinburgh. Previous comprehensive experience and apprenticeship with good electrical contractor essential. Excellent opportunities for advancement and promotion.—Apply in confidence stating age, experience, and any technical qualifications to A. Stuart Thomson, B.Sc., Auchraw of Mailer, Perth. (E 633)

ELECTRICAL DRAUGHTSMEN for oil refinery work, experienced in wiring and installation layouts and taking off quantities. Should be capable of laying out small sub-stations and switch-houses. Knowledge of cable layouts and flame-proof conduit work desirable. Five-day week, with paid overtime.—Apply by letter, stating age, experience, salary expected, and when free to commence work, to Chief Draughtsman, The Lummus Co., Ltd., 525 Oxford Street, London W.1. (E 644)

CONTROL ENGINEERS

CONTROL ENGINEERS for network operation, required by Major Oil Company in Middle East for control centre covering operation of extensive overhead and underground transmission and distribution networks up to 66 kV. Applicants must be experienced in the operation of indoor and outdoor metal-clad switchgear at all voltages, transformers and associated substation equipment. Age not over 35. Attractive salary plus generous allowance in local currency, free passages out and home, free medical attention, kit allowance, good leave arrangements, pension scheme.—Write, giving personal particulars and details of qualifications and experience, quoting

Dept. F.116 to Box No. 2584 at 191 Gresham House, E.C.2. (E 389p)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

CLANG, LTD., of Cricklewood, require SALARIED REPRESENTATIVE for S.W. England and South Wales. Applicant must be a resident of this area, own a car, and have good knowledge of the wholesale electrical trade.—Write, stating full details of experience, etc. (E 646)

DESIGNER/DRAUGHTSMAN required by the manufacturers of "Temco" electrical wiring accessories. Must be familiar with the light electrical apparatus industry. This post carries a good salary and offers scope for advancement for the right man.—Write, giving full details of experience, to Personnel Manager, Telephone Manufacturing Co., Ltd., Martell Road, West Dulwich, S.E.21. (E 521)

DESIGNER DRAUGHTSMAN required for the Engineering Laboratory of a large light engineering firm in the West London area, for development work. Should have a knowledge and experience of tool design.—Apply, giving details of age and experience, to Box No. 1281, Electrical Times. (E 568)

DRAUGHTSMEN required, experienced in design of control gear or airbreak switchgear. Permanency for young, energetic men. Attractive salary.—Write, stating age, qualifications, and experience, to Box No. 1307, Electrical Times. (E 638)

ELECTRICAL DRAUGHTSMAN required by major oil company for service in the Middle East. Must have served five years' electrical engineering apprenticeship and have had five years' D.O. experience in connection with electrical layouts of large industrial plants with underground cable networks. Should possess Higher National Certificate; Graduate or Associate membership of a corporate engineering body desirable but not essential. Maximum age limit 35 years. Attractive salary plus generous allowance in local currency. Free passages out and home, free medical attention, kit allowance, good leave arrangements, pension scheme.—Write, giving personal particulars and details of qualifications and experience, quoting Dept. F.192, to Box No. 2693 at 191 Gresham House, E.C.2. Applicants without above requirements will not be considered. (E 536)

ELECTRICAL ENGINEERS required for service in Middle East. Applicants should (a) possess Ordinary or Higher National Certificate and have had full apprenticeship with heavy electrical equipment manufacturers or with a large colliery or allied fully electrified industry, or (b) possess a degree and have had two years' technical apprenticeship with similar firm to above. In each case applicants must have had at least three years subsequent experience on the installation and maintenance of heavy electrical equipment. Maximum age limit 35 years. Attractive salary, plus generous allowance in local currency, free passages out and home, free medical attention, kit allowance, good leave arrangements, pension scheme.—Write, giving personal particulars and details of qualifications and experience, quoting Dept. F.191, to Box No. 2693, at 191 Gresham House, E.C.2. (E 415)

ELECTRICAL ENGINEER with extensive practical experience and sound knowledge of theory required by Tin Dredging Company in Malaya. Excellent prospects. First contract 3 years, 6 months' leave on full pay if contract renewed. Salary £580 to £700 per annum according to experience, plus cost-of-living allowance £210 per annum. Free furnished quarters provided. Single man, age limit 32 years.—Written applications, with full particulars of age, education, including studies at Evening or Technical Institute, training and experience, and copies of testimonials, to Box 4182, Walter Skinner, Ltd., 20 Copthall Avenue, London E.C.2. (E 552)

DRAUGHTSMEN
For South Africa

TWO DRAUGHTSMEN required for the works of Johnson and Phillips, Ltd., at Johannesburg, South Africa. The following qualifications are necessary.

Apprenticeship with a leading switchgear manufacturer, suitable technical training, at least two years' intensive drawing office experience. Senior or well experienced men preferred, but a younger man of the right calibre would be considered. Salary £600 to £780 per annum according to experience and seniority, plus statutory cost-of-living allowance (at present £57 4s. p.a.). Applications, which will be treated in strict confidence, to

Employment and Welfare Manager, Johnson & Phillips, Ltd., Charlton, S.E.7

(E 565p)

DRAUGHTSMEN required immediately with experience in design of structural steelwork, or platework, or pipework for steam boiler plant for priority contracts.

Apply:

John Thompson Water Tube Boilers Ltd.

Wolverhampton (E 522p)

ELECTRICAL ENGINEER OR PHYSICIST, with experience of the manufacture of valves or cathode ray tubes, and with Higher National Certificate or equivalent, is required by an X-ray tube production unit for technical control work.—Apply to the Personnel Officer, G.E.C. Research Laboratories, North Wembley, Middx., stating age and record. (E 618)

ELECTRICAL ENGINEERS, age 26 to 33 years, with qualifications of Higher National Certificate standard and experience in manufacture, repairs and maintenance of electrical plant are required as Inspecting Engineers in districts: Oxford, Worksop, Stafford, Coventry, St. Albans and Dunfermline. Progressive salary, commencing £450 rising to £650 per annum, and free pension scheme. Contributory Widows and Orphans scheme.

Apply in own handwriting, stating age, qualifications, experience and whether married or single, by letter marked "Electrical Inspector" to Chief Engineer and General Manager, The National Boiler and General Insurance Co. Ltd., St. Mary's Parsonage, Manchester 3. (E 616)

ELEXCEL LIMITED require ADDITIONAL SALES REPRESENTATIVES to operate the following areas: South Western, Yorkshire, East Midlands and South Wales Electricity Boards.—Applications, giving full particulars of previous experience, etc., in strictest confidence, to Sales Manager, Victor Works, Broadgreen, Liverpool 14. (E 624)

ENGINEER DRAUGHTSMAN, with experience in design, layout, and installation of complete electrical equipment for gas and chemical plants, required by firm of engineers and contractors on N.E. Coast.—Apply, stating age, experience, and salary required to Box No. 1309, Electrical Times. (E 640)

ENGINEER wanted for sales office of electrical manufacturers near London, to handle quotations and technical correspondence. Experience of motor control gear design essential. Salary £500-£600 per annum.—State age and experience to Box No. 1289, Electrical Times. (E 578)

ESTIMATOR required, age 25-30. Technical education to National Certificate standard. Knowledge of estimating procedure, electrical plant. To be responsible for a considerable volume of estimating correspondence and records in Department developing cable accessories.—Apply in writing, stating age, experience, education and salary required to Personnel Department, Scottish Cables Ltd., Deanside, Renfrew. (E 619)

IMPERIAL CHEMICAL INDUSTRIES, LTD., invite applications for the position of ASSISTANT ENGINEER in the Electrical Section of the Company's Power Department at Runcorn. Applicants, who should not be more than 30 years of age (or thereabouts), should hold a university degree in electrical engineering, should have had a good basic training in electrical practice and some experience of power station equipment, extra high-voltage distribution systems, and rotary converting machinery. The successful candidate will be required to join the company's superannuation scheme and to pass a medical examination.—Applications, stating age, qualifications, and giving full particulars of training, experience, and present position, should be sent to Staff Manager, Imperial Chemical Industries, Ltd., General Chemicals Division, Cunard Building, Liverpool 3, quoting reference EL/4. (E 647)

MECHANICAL OR ELECTRICAL ENGINEER, with degree or equivalent, required immediately to take charge of a section of the Development Dept. of a well-known Engineering Company in the S.W. London area. Applicants must have plenty of initiative and possess a progressive outlook. They should give full details of their training and experience and should also state the salary they require.—Box No. 1265, Electrical Times. (E 543)

FITTERS AND WINDERS experienced in large repair shop practice, wanted urgently. —Apply, in person or writing, Dowding and Mills, Ltd., Camp Hill, Bordesley, Birmingham 12. (E 344p)

SWITCHGEAR ESTIMATOR

For South Africa

SWITCHGEAR ESTIMATOR is required for the works of Johnson and Phillips, Ltd., at Johannesburg, South Africa.

Duties: handling inquiries and preparing estimates for locally-built and/or imported switchboards and components. Handling orders and passing instructions to works. Salary £720 per annum, plus statutory cost-of-living allowance (at present £57 4s. p.a.). Applications, which will be treated in strict confidence, to

Employment and Welfare Manager, Johnson & Phillips, Ltd., Charlton, S.E.7

(E 564p)

INTERESTING and progressive position exists for ELECTRICAL DESIGN DRAUGHTSMAN in rapidly expanding company. Experience on light, relay and electro-magnetic components in aircraft would be an advantage.—Apply to Mr. G. T. Atkins, Electrical Engineer, British Messier Ltd., Cheltenham Road East, Gloucester. (E 620)

MOTOR DESIGNER required for the F. H. P. Motor Laboratory of a large light electrical engineering company, in the West London area. Applicants should have a sound technical and practical training, with initiative to accept full responsibility of a project from the initial design stage to factory production. Excellent prospects if qualifications and experience are suitable. Apply, giving details of age, education and job history, to Box No. 1279, Electrical Times. (E 567)

OVERHEAD LINESMAN AND MATES required. Manchester and Northern Ireland.—Apply, J. L. Eve Construction Co., Ltd., 17 Hill Side, Ridgway, Wimbledon, London S.W.19. (E 631)

QUALIFIED ELECTRICAL ENGINEER as sales representative to take charge Midlands office of temperature control manufacturer. Some heating experience an advantage.—State age, experience and salary required, to Box No. 1287, Electrical Times. (E 577)

REPRESENTATIVE required for West Riding area: Electric motors, starters, also pneumatic cylinders and control valves. Training in the latter considered to right man. Only men having sound connections with leading firms need apply.—Write Box No. 1315, Electrical Times. (E 669)

SALARIED REPRESENTATIVE required with established connection London accessories buyers; some contracting experience an advantage. Commission and good prospects for able man. State age, previous experience and basic salary required.—Box No. 1285, Electrical Times. (E 576)

SENIOR AND JUNIOR ELECTRICAL DESIGNERS, experienced in all classes of a.c. and d.c. dynamo electric machines from 5 to 5,000 h.p./kW. 5-day week. Superannuation scheme in operation. Applications, stating age, experience and salary expected, to Personnel Manager, Lancashire Dynamo & Crypto, Ltd., Trafford Park. (E 670)

SENIOR AND JUNIOR ESTIMATORS required by Bull Motors, Ipswich. The work involved covers the preparation of quotations for small and medium size electric motors, control gear, etc.—Applicants should submit full details of age, experience, salary required to: The Sales Manager, Bull Motors (E. R. & F. Turner, Ltd.), Foxhall Works, Ipswich. (E 553)

SENIOR ELECTRICAL ENGINEER, able to direct and control research, development, design and drawing office of old established light electrical manufacturers. Excellent prospects for man with first class experience.—Fullest particulars of career to date and salary required in confidence to Box No. 1303, Electrical Times. (E 614)

SWITCHGEAR. Good opportunity exists for keen DESIGN DRAUGHTSMAN, capable of working with a minimum of supervision, to assist in a programme of expansion of company's switchgear products. Only those having workshop training and actual experience of electro mechanical design of industrial switchgear up to 11 kV will be considered.

Applications, giving full particulars of age, experience and training, together with salary required, to Employment and Welfare Manager, Johnson and Phillips Ltd., Charlton, London S.E.7. (E 515)

TEST ENGINEER to take charge of test department dealing with a.c. and d.c. motors and generators, ¼-500 h.p.—Applications, with full details to Higgs Motors, Witton, Birmingham 6. (E 671)

TESTING ASSISTANT urgently required for dry core telephone cable department in modern cable factory. Must be fully conversant with test requirements for British Post Office specifications covering twin local, star quad, and multiple twin construction. Age approx. 25.—Full details of experience and salary required to Messrs. Aberdare Cables Limited, Aberdare, Glam. (E 652)

TRANSFORMER DESIGNER. A competent Transformer Designer with experience in all classes of power transformers is required. Applications, stating age, experience, training and salary required, should be addressed to Employment and Welfare Manager, Johnson and Phillips Ltd., Charlton, London S.E.7. (E 516)

TRANSFORMER DRAUGHTSMAN. An experienced senior Transformer Draughtsman is required capable of handling work up to 5,000 kVA.—Applications, stating age, experience and salary required, should be addressed to Employment and Welfare Manager, Johnson and Phillips Ltd., Charlton, London S.E.7. (E 517)

YOUNG ENGINEERS wanted for Contracts and Sales Department of electrical manufacturers near London. Keen, energetic men, age approximately 25 years, required. Positions have prospects of outside sales engineering later.—State age, experience and salary required to: Box No. 1311, Electrical Times. (E 641)

YOUNG MECHANICAL ENGINEER, preferably with degree or equivalent, required immediately to take charge of development testing of small internal combustion engines. Previous test bed experience is essential. This is a new appointment holding good prospects for the right type of man. S.W. London area. Applicants should give full particulars of their training and experience, and state the salary they require.—Box No. 1267, Electrical Times. (E 544)

APPOINTMENTS WANTED

ELECTRICIAN (32), pre-war C. and G. 1st class, B. and C. certificates. Full experience a.c. and d.c. installation and maintenance, desires change to interesting and progressive position. Preferably N. London region.—Box No. 1295, Electrical Times. (E 590)

FOREMAN ELECTRICIAN (26), single, requires change. Conduit, Pyro, P.I.L.A.C., for S.W. England, pref. factory installations.—Box No. 1313, Electrical Times. (E 649)

REPRESENTATIVE. Commission; well connected Mid. Elect. Board. Wholesalers and industry in B'ham and Midlands, seeks agencies.—Box No. 1275, Electrical Times. (E 559)

WELL-KNOWN MANUFACTURERS' AGENT shortly free. W.A. or S.S. and F.G. preferred, high level contacts with London, Southern, South Eastern and Eastern Area Boards, wholesalers and local authorities. Also Government Departments. Would consider salaried appointment, but commission basis preferred.—Box No. 1243, Electrical Times. (E 497)

WANTED

A.C./D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Phone: Chiswick 5105. (A 20)

WANTED.—D.C. and a.c. ball-bearing MOTORS.—Full details to Britannia Manufacturing Co., Ltd., 22/26 Britannia Walk, London N.1. (A 13)

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WANTED, ROTARY CONVERTORS, any size.—Universal, 221 City Road, London E.C.1. (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady St., Bethnal Green, E.1. (A 1)

WANTED.—Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED, quotations for installing Hydro Electrical Generating Plant, about 50 kW, South Wales.—Apply, J. G. Jenkins, Ltd., Manoravon Works, Morriston, Swansea. (E 632)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed.—Edgware 8631 (4 lines). Service Electric Co. Ltd., Stanmore, Middx. (D 324)

ARMATURE ROTOR AND STATOR WINDING. We specialise in the repair and rewind of all types of electrical machines from fractional h.p. upwards. Special departments for vacuum cleaners, dryers, portable tools, etc. All work fully guaranteed.—Walter Crane, Greencoat Electrical Works, Westgate, Wakefield. Telephone 2172. (A 4)

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ELECTRICAL INSTALLATIONS, lighting, power and heating. Factories maintained: motors rewound and repaired.—C. A. Penny, 43 Benson Road, Forest Hill, S.E.23. For. 3397. (E 650)

ZEROS REFRIGERATORS.—Complete range of repair and service now available. Equipment reconditioned to conform to pre-war manufacturers' specifications.—Time Engineers, Refrigeration Specialists, 60 Southend Road, Rainham, Essex. Tel.: Rainham 2358; or Southern Area Agency, Tel.: Springpark 4217. Electrical Spares supplied to the trade. (A 639)

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CLEARANCE SALE! 650 ELECTRIC BED WARMERS, enamelled metal casing, lamp heated, 25 W, with flex. Unused. Shop-soiled. 5/- each, or £130 the lot.—Box No. 1305, Electrical Times. (E 625)

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4-K.W. IMMERSION HEATERS, 26in. long with Satchwell thermostats. £6/10/- each, carr. and packing paid. —Winco Industries, 17 Stretford Road, Manchester 15. Tel.: Mos 1364. (E 485)

36 ONLY, 12 gallon electric pressure-type WATER STORAGE HEATERS, wired for 127 V, 1,200 W, ivory finish. Cost £16/2/5 each. These heaters are frustrated from export. Offers invited. Must be cleared.—Rabone, Petersen and Co. Ltd., Birmingham 1. (E 626)

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LADDERS (wooden and aluminium, all types), Trestles, Steps, Handcarts, etc., from Ramsay and Sons (Forfar) Ltd., Forfar (Tel. 172). (C 603)

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GENERATOR SETS. Three Diesel-engined Generator Sets, 62 kVA, 400/230 V, 3-phase, 4-wire, 50 c/s. Complete units incorporating cooling system, meters, switch board, batteries and automatic voltage regulator. These sets have been in use only during the industrial staggered hours periods, and they are in excellent condition.—Offers to J. W. Squire Ltd., 169-171 Humberstone Road, Leicester. Phone 65169. (E 654)

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NORMAN LYON PETROL GENERATING SETS. Villiers o.h.v., air-cooled engine, 500/550 watts, 18 V, 30.8 amps d.c. generator; unused, £19/10/-, delivered nearest railway station, or f.o.b. English port.—J. Parker, St. Peter's Power House, Jersey, C.I. (E 666)

1 ALTERNATOR, G.E.C. 6,500 kW 0·9 power factor 6·6 kV 3-phase 50 c/s, at 500 r.p.m. Two-bearing Alternator, complete with exciter and bedplate, together with panel.—Apply: C. J. Rice, 137 Mayplace Road West, Bexleyheath, Kent. Tel.: Bex. 3282. (E 573)

100 KVA MODERN DIESEL ALTERNATOR SET. Comp.: vert. 4-cyl solid injection oil engine on baseplate coupled to 400/230 V 3 phase 50 c/s 1,000 r.p.m. alternator. Details on request.—Thos. W. Ward, Ltd., Albion Works, Sheffield. (E 112)

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PURLEY CHOKES AND BALLASTS. Silent operation, excellent performance, efficient, long life, vacuum impregnated, quick delivery. Low price (e.g. Purley Queen, 80 watts, 14/6 each, less quantity and cash discounts). Quotations for export.—F. W. Blanshard, Ltd. (Dept. ET), Purley, Surrey. (F 343)

60 G.E.C. MERCURY VAPOUR FITTINGS, complete with lamps, chokes and condensers, for sale. Perfect condition.—Box No. ET492, L.P.E 110 St., Martin's Lane, W.C.2. (E 668)

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A. A. ELECTRICAL CO.—FOR A.C./D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Fairlands 8279, 67 Rothschild Road, W.4. (A 19)

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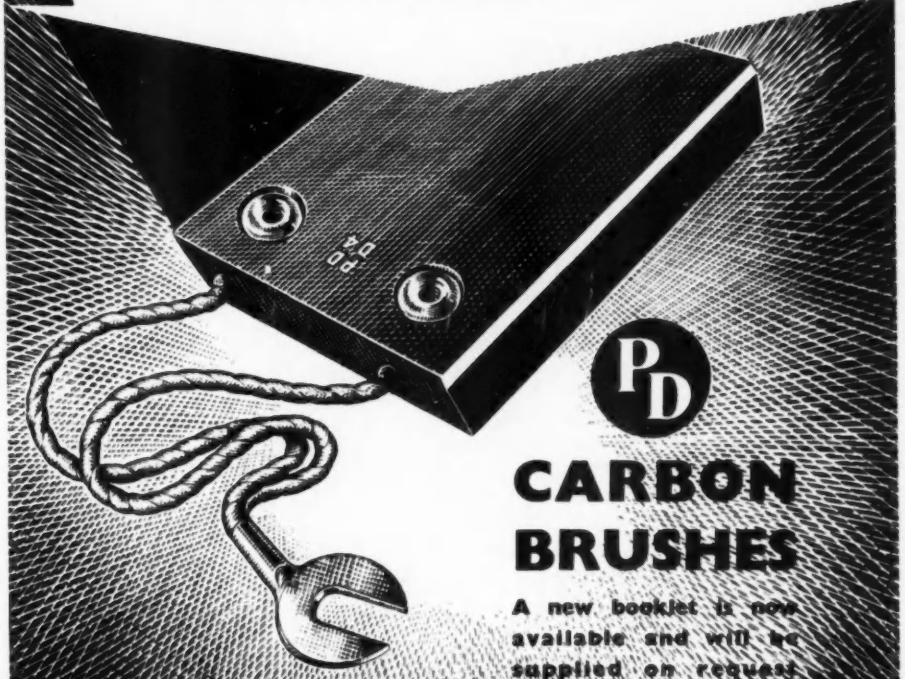

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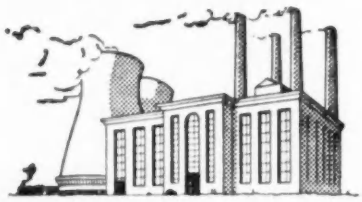

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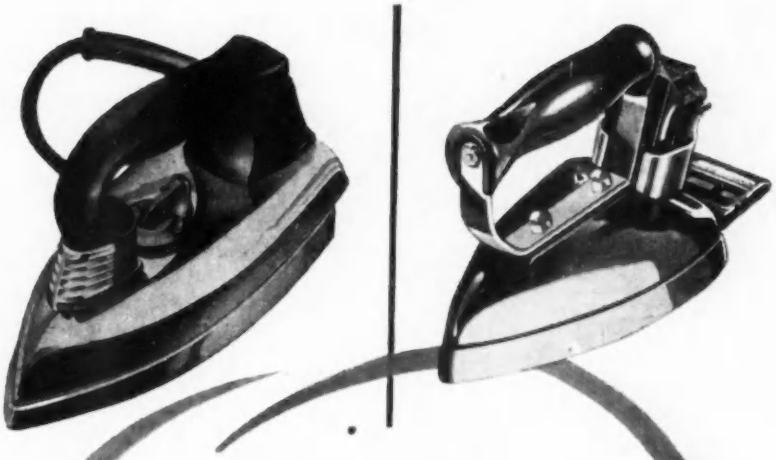

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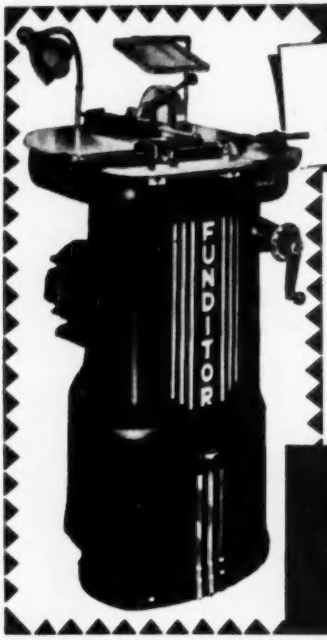

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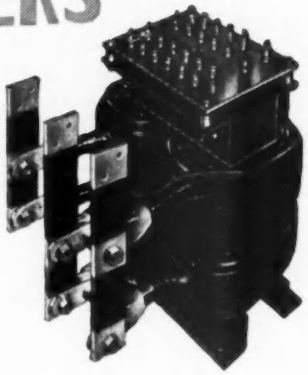

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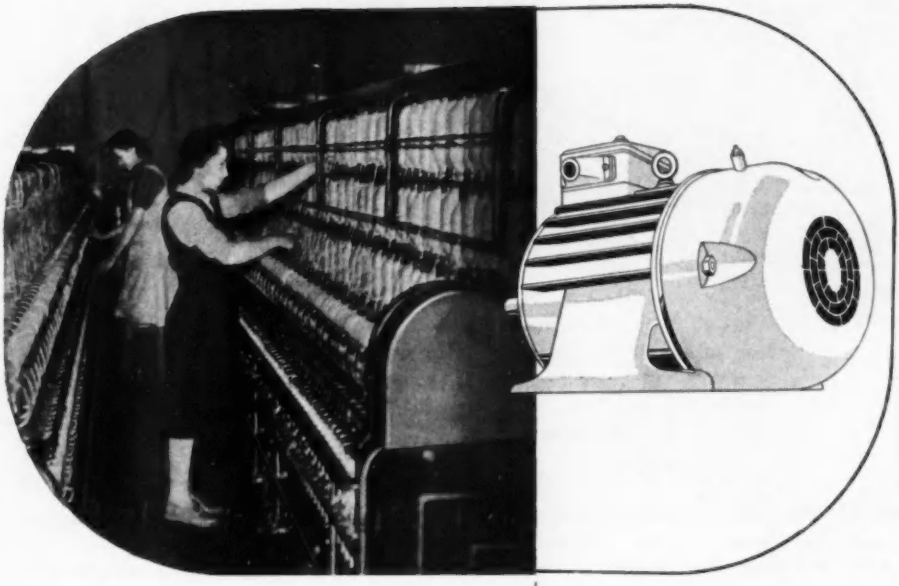

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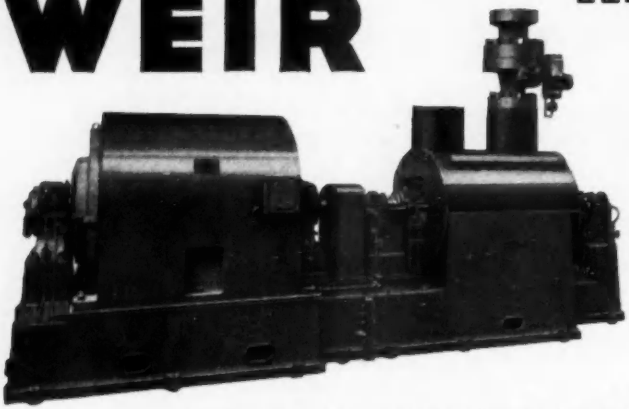

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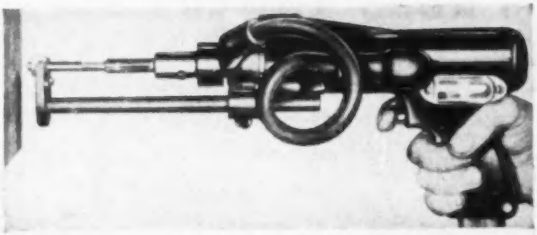

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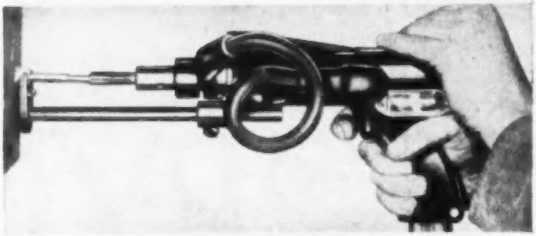

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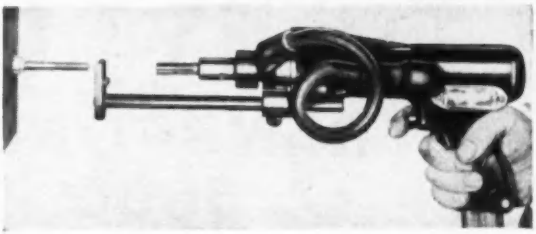

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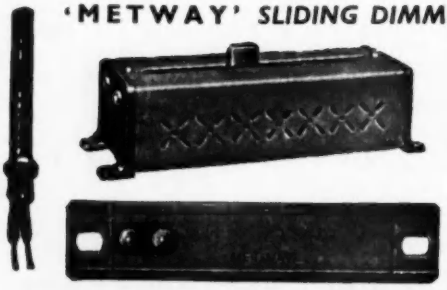

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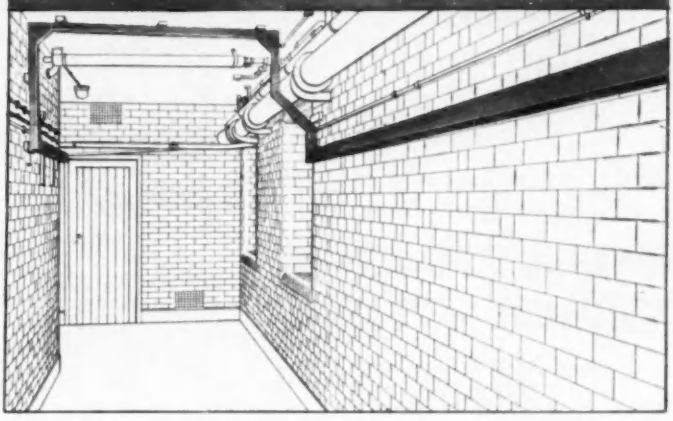

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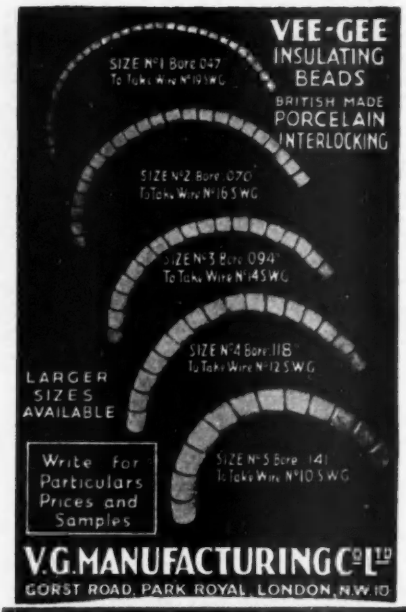
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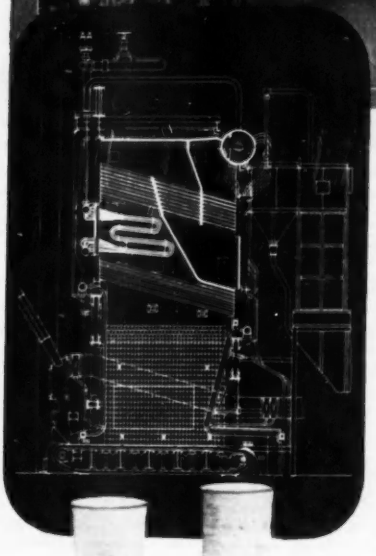

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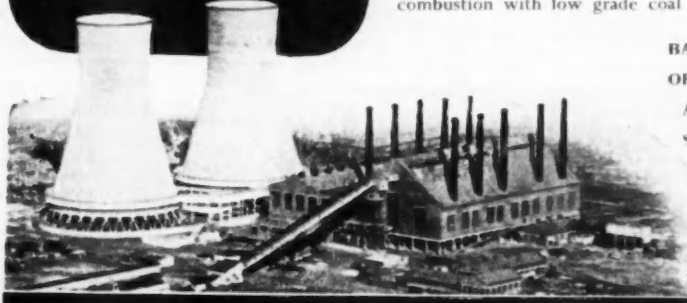

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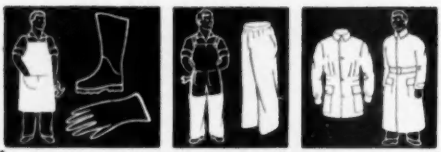

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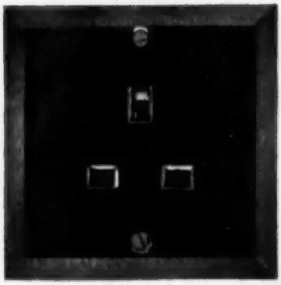

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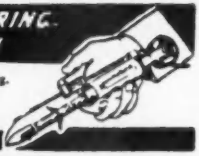

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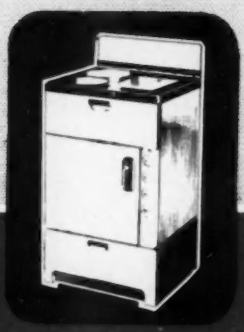

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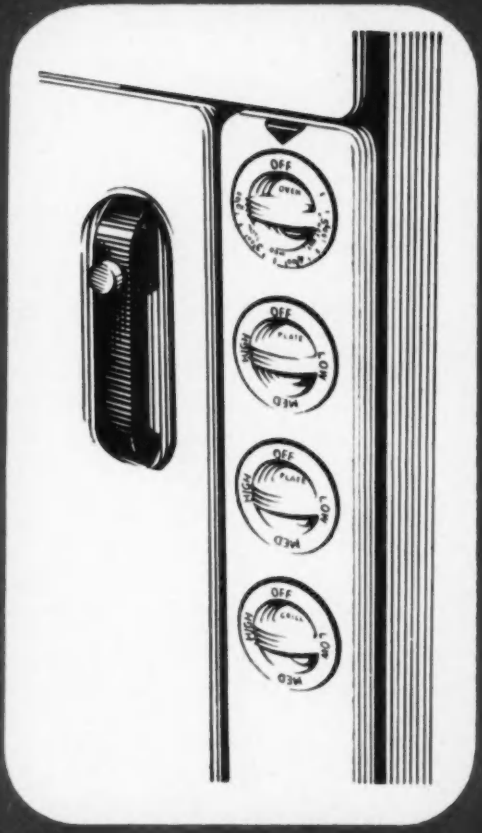

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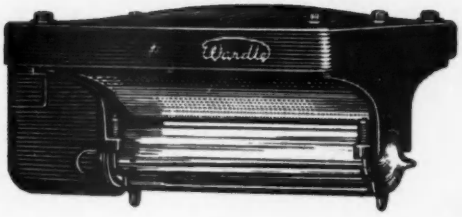

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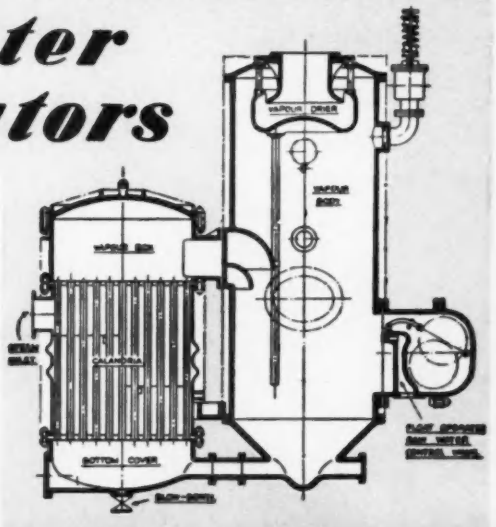

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